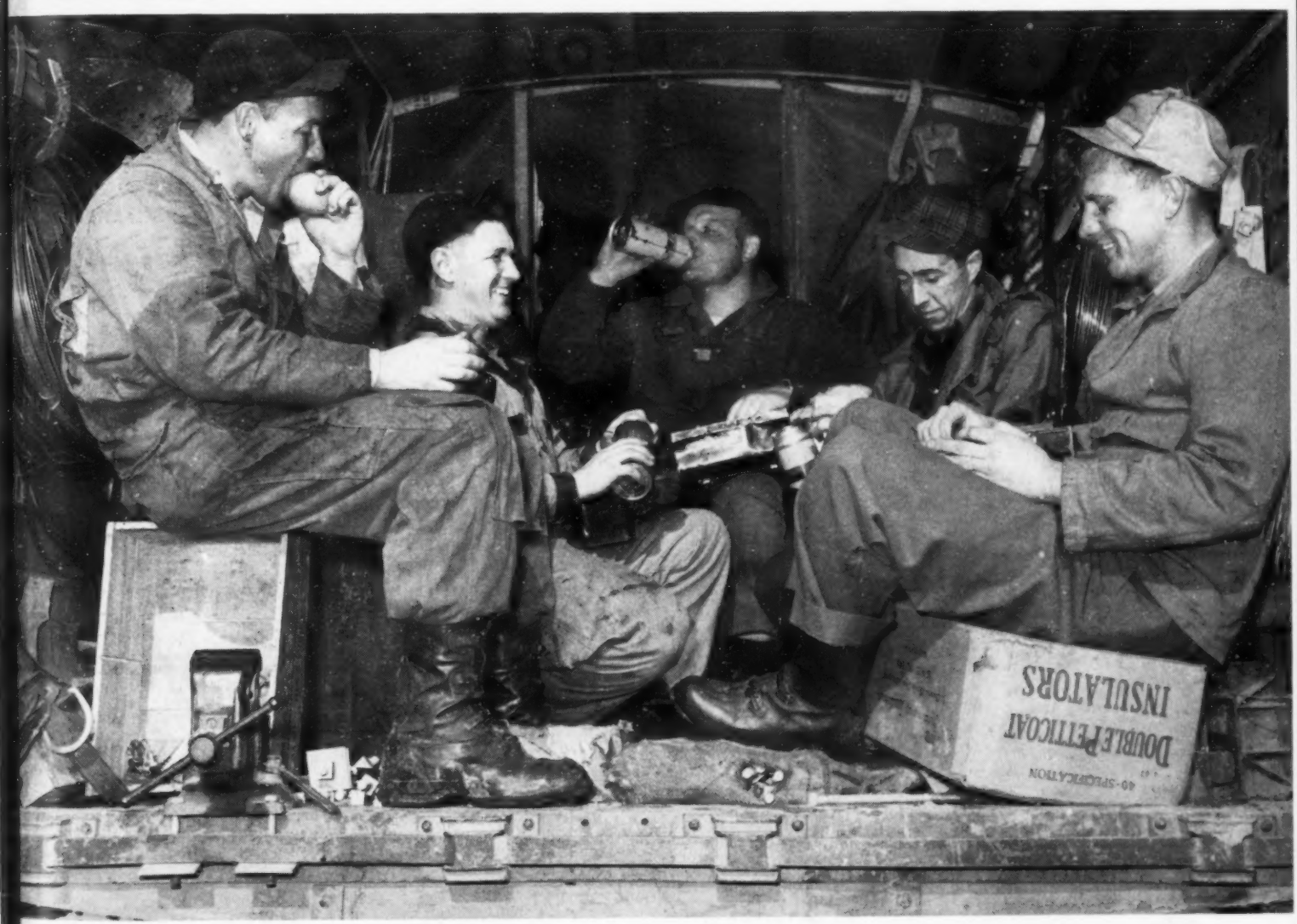
TELEPHONE ENGINEER and MANAGEMENT



APRIL, 1948

THERE'S NO FUEL SHORTAGE IN GUYMON, Oklahoma

Like Rip Van Winkle, Guymon slept. Then suddenly the alarm went off and Guymon's population found itself sitting on top of the world's richest natural gas field. The fabulous Guymon-Hugoton gas field has an estimated reserve of 18 trillion cubic feet, and Guymon is surrounded by wells capable of producing 40 million cubic feet a day.

With this tremendous reserve under foot, there is no fuel shortage in Guymon. Natural gas is the only fuel available here for both industrial and domestic use, and the rates are believed to be the lowest in the Nation. Contract rates range as low as 12¢ per thousand cubic feet.

Production of natural gas is a specialized business and it demands a concentration of skilled personnel at the point of operation. Telephone Directory publishing, too, is a specialized business. The Southwestern Associated Telephone Company recognizes this. As a result, our specialized organization has been employed to publish telephone directories for the Guymon area which is served by Southwestern Associated Telephone Company. Consequently, the telephone subscribers in the Guymon area have received better telephone service through the medium of accurate, attractive directories, consistent with the high standards of the Telephone Industry. Further, the Telephone Company has been relieved of all details of directory publication and at the same time the gross advertising revenue from directory operations has increased considerably.

Your telephone directory should be a hard-working, money-making ambassador of good will for your Company. If, somehow, it seems to fall short of these objectives we would be happy to submit a complete Directory Service Plan tailored to the needs of your Company for your consideration. No obligation, of course.

General Telephone Directory Company

Eastern Office: 185 North Wabash Avenue, Chicago 1, Illinois, Telephone State 5478
Western Office: Press-Telegram Building, Long Beach 12, California, Telephone 6-7221

PHOTO OF HAND BY WIRE
Chicago Receives X-Ray Picture From New York in 7 Minutes
(By Associated Press.)
MOVIES BY TELEPHOTO
Likeness of Chicago Film Sent to N. Y. by Telephone
(By Associated Press)
WIRE PHOTOS SEEN AS NEW INDUSTRY
Besieged by
to View
ess.
PICTURE
TOPOGRAPHIC MAP IS SENT BY PHONE
Guardsmen Transmit Surve
Roads, Buildings, Brooks
Hills at Mt. Gretna
FIRST TIME IN HI
Mt. Gretna, June 11.—Fo
time in military history the
PHOTOGRAPHS BY PHONE
New System Wac Used to Broadcast Picture of New Oakland Car
The remarkable new system of sending photographs by telephone, recently perfected by the American Telephone and Telegraph Company and known as the Telephotograph, was used for the first time in broadcasting a new picture centring about a motor car when the presentation of the first new Pon-

23 YEARS AGO THIS MONTH

Commercial telephotography made its debut

In New York, Chicago and hundreds of other places, an event of national interest occurs. Within a few hours, millions of people from coast to coast are reading the news . . . and seeing photographic reproductions of what took place.

Only since April 4, 1925, has telephotography been available for commercial use. During the years that followed, the public became so accustomed to receiving this service that it is now accepted as a matter of course. But regardless of acclaim or lack of it, the telephone industry, which made the service possible, keeps moving ahead toward other achievements . . . living up to its tradition of faithfulness and dependability.

In Exide Batteries you will find the same dependability for which telephone service is famous throughout the world. Since 1895, Exide Batteries have been proving themselves worthy of that trust.

Exide
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

IT SEEMS TO US

HARRY M. ENGH, president of the Pennsylvania Telephone Corp., Erie, promised to attend the Galveston convention of the Texas Telephone Association last month and therein lies a tale. To keep his promise Harry landed at New York from a cruise ship on March 14 and made an all night flight to Galveston and attended the opening session. He was an honored guest at the Luncheon given for OSCAR BURTON, president of the USITA.

• • •

The presidents of the Missouri Telephone Association, F. M. BROWNE, and Kansas Telephone Association, FOSTER LAMING of Tonganoxie, Kan., also honored Texas by their attendance at the convention there. We are not making a report on fishing catches for obvious reasons.

• • •

WALTER C. HASSELHORN, president of Cook Electric Co., Chicago, can be justly proud of the new type air speed indicator developed by that company which measures true air speeds up to 3000 miles per hour. The device measures speed at rates over four times the speed of sound was conceived in the Cook Research Laboratories and developed under contract with the Air Materiel Command.

• • •

Congratulations to Lincoln (Neb.) TELEPHONE NEWS for bringing us the first Robin of the year via its beautiful March cover by Lon Keller. The Lincoln T.&T. House Organ hit our desk on a particularly xoxox-o (you name it) Chicago day, and artist Keller's Robin Red Breast made us realize that better days are ahead . . . If you happen to be a bird fancier, by all means let A. B. Gorman know you'd like a copy of his attractive March issue.

• • •

Personnel changes in various parts of the country have been top news during past few weeks. We extend our congratulations to:—G. B. ROGERS on his advancement to secretary-treasurer's post with Wisconsin Bell, succeeding W. H. HILLER, retired, and to HARRY S. HANNA on his election to presidency of Indiana Bell, succeeding WM. A. HUGHES who moves to New Jersey Bell as president.

The National Telephone Magazine

TELEPHONE ENGINEER and MANAGEMENT

APRIL, 1948 **VOL. 52, NUMBER 4**

Editor, RAY W. SMITH • *Advertising Director*, ROY F. SMITH
Managing Editor, JOHN G. REYNOLDS • *Promotion Manager*, DON C. SORENSON
Washington Bureau, ROLAND C. DAVIES *and* FRED HENCK
Circulation Mgr., BERNADINE STEPHENS • *Production Mgr.*, MARGARET INDIA

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COVER: Thanks to Michigan Bell for this month's cover photograph depicting a scene that is familiar to all telephone men—lunch hour on the job.

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GOT A CONSTRUCTION BACKLOG?

SPEED-UP WITH FWD TRUCKS

Most utilities face construction "backlogs"... and are concerned about the job of catching up on construction and deferred maintenance, system expansion, modernization programs and other steps to meet increased demands for utility services.

FWD four-wheel-drive trucks are built to help you "speed up" safely, profitably. You can depend upon these utility-engineered trucks for the most rugged heavy-duty service, anywhere, on or off the highways. FWDs rate as America's No. 1 heavy-duty line trucks, according to a recent independent survey on utility perference for trucks. FWDs have an outstanding performance record among utilities. Over 200 utilities operate fleets, some having purchased 200 or more.

For complete information see GraybaR, or write —

THE FOUR WHEEL DRIVE AUTO CO.
CLINTONVILLE, WISCONSIN
Canadian Factory: KITCHENER, ONTARIO

Distributed by GraybaR

America's Foremost FWD ***Heavy-Duty Truck***

Crapo

Galvanized Steel* CABLE LASHING WIRE

AVAILABLE FOR PROMPT DELIVERY!

The new *Crapo* Galvanized Steel Lashing Wire (.091-inch diameter) now is available for almost immediate delivery. This improved wire has been developed especially for use with modern cable-spinning machines. It is manufactured from selected steel, carefully processed and heavily galvanized to conform, in every respect, to specifications approved by leading telephone engineers.

Crapo Galvanized Steel Cable Lashing Wire comes in neat, compact, thread-lay coils containing approximately 325 feet. Packed in cartons of 6 coils each.

Ask your Jobber or write direct!

*Crapo Cable Lashing Wire also is available in "Stainless Steel," .065-inch and .045-inch diameter.

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

• • •

The Open Forum

Speedy Results . . .

Dear Sir:

We are indeed pleased with your article in TELEPHONE ENGINEERING AND MANAGEMENT on recruitment of civilian personnel to back up our Army of Occupation Overseas. I know you will be glad to know that a number of inquiries emanated from it. In addition, an Outside Plant Construction Engineer—well qualified in his field—has been selected, and he will soon be on his way to Japan.

Thank you very much for your assistance in this matter.

(Mrs.) Jeanne C. Nelson
Representative, Office of Secretary of Army

Glad our suggestion worked. Anytime we may be of assistance to our good old Uncle you'll find us eager to cooperate.—Ed.

• • •

Series Makes a Hit . . .

Dear Sir:

We would appreciate your sending us a copy of the article in the June, 1947 issue of TELEPHONE ENGINEER AND MANAGEMENT entitled:—"New Toll Switching Plan For Nation Wide Toll Dialing."

G. N. Donovan
Librarian,
Western Electric Co.,
Kearney, N. J.

Requests for this popular series have been numerous; proves efficiency of USITA Dial Interexchange Committee in making the article available for publication.—Ed.

• • •

Permission Granted . . .

Dear Sir:

One of our courses here at Iowa State College requires a formal report on some subject related to our particular field of study. I have chosen to write on mobile telephony. The college library has sent the 1947 copies of TELEPHONE ENGINEER to the bindery and they may not be back for some time. The series of articles by John G. Reynolds on mobile telephony would be very beneficial to my report.

Could you please send me copies or abstracts of the past series and, if possible, any which are to follow. This report is due in one month. I would also like permission to quote excerpts from the articles.

Harold H. Hoffman
Student of Elect. Engr.
Iowa State College

The complete series went forward. We hope the material will help you produce an "A+" paper.—Ed.

• • •

"Flexiduct" Article Brings In the Mail . . .

Dear Sir:

We would like very much to receive catalogs and prices on the new overfloor duct which is sold under the trade name of Flexiduct referred to in the article entitled "New Over-Floor Duct Proves In" by J. S. Reed which appeared on pages 38-39 of the January, 1948 issue of the magazine "TELEPHONE ENGINEER AND MANAGEMENT".

It will be very much appreciated if you will forward this letter to the manufacturer of the "Flexiduct" described in the article, or if this is not practicable, furnish us with the name of the manufacturer.

A. J. Greggio
International Standard Elec. Corp.
New York, N. Y.

Looks as though Winders & Geist, founders of Flexiduct Co. have a product that is a natural for the telephone industry. Many letters of inquiry have came in since appearance of Mr. Reed's article. —Ed.

• • •

Dear Sir:

Back in April 1945 you published a monthly series of articles on the subject Radio Course for Telephone Men. We have found it very helpful and believe it will be more helpful as time goes on and we get more and more carrier and radio equipment tied in with telephone equipment.

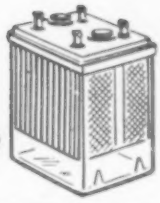
Therefore, we wonder if you have this article reprinted and put up in a booklet or handbook. We hope so and would like a copy if it is available.

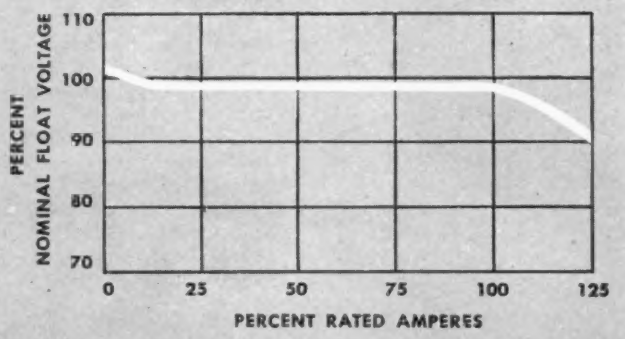
Robert A. Dowling
Pattersonville Telephone Co.
Rotterdam Junction, N. Y.

Requests continue to come in for our popular "Radio Course For Telephone Men"—and we are entirely out of copies. . . . We would consider bringing the material up-to-date and running the series if enough readers are interested . . . again, how about it?—Ed.

BATTERY-CHARGER FUNDAMENTALS—

how constant voltage increases battery life





Typical Voltage Regulation Curve of the E. P. Diverter-Pole Motor-Generator

Operating records of many exchanges show that the E. P. Diverter-Pole Battery Charger increases battery life from six to fourteen years. Its steady voltage eliminates the dangers of both *low* and *high* voltages. Batteries are maintained at their correct charge under a full floating system, to fully protect exchange requirements. High battery temperatures, excessive gassing, and undue breaking down of the active cell material are prevented to assure the longest possible battery life. Keeping a battery in a fully-charged condition at all times means that it is ready to furnish power at peak current demands beyond the capacity of the charger, and that it stands ready to provide emergency power in case of an interruption of the commercial power supply.

why EP motor-generators are best . . .

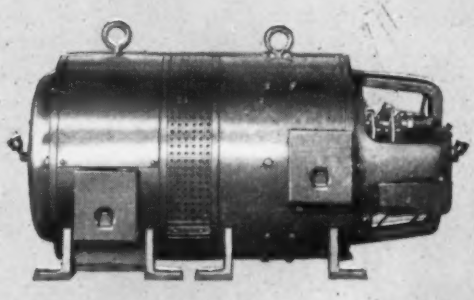
Since 1923, Diverter-Pole Motor-Generators have proved to be the most reliable, maintenance-free and efficient source of direct current for Telephone Exchanges. The characteristics of E. P. Diverter-Poles are ideal not only for the most satisfactory floating charge (a full floating charge is now the accepted standard), but also for carrying the major portion of the exchange load better than any other source of direct current.

The main reason for this superiority is that The Electric Products Company is a specialty manufacturer. For every exchange battery-charging application, E. P. designs and builds an individual Motor-Generator that fits exactly the requirements of the particular operation.

The result is Proved Performance as evidenced by the unequalled long-life records established by Diverter-Poles throughout the Telephone Industry.

For complete details . . .

ASK FOR BULLETIN 209



E. P. DIVERTER-POLE BATTERY CHARGERS

- **Are completely automatic**
- **Control exchange voltage well within high-low limits at all times**
- **Lengthen battery life**
- **Are self-protecting against dangerous overloads**
- **Will not "run away" or reverse polarity**

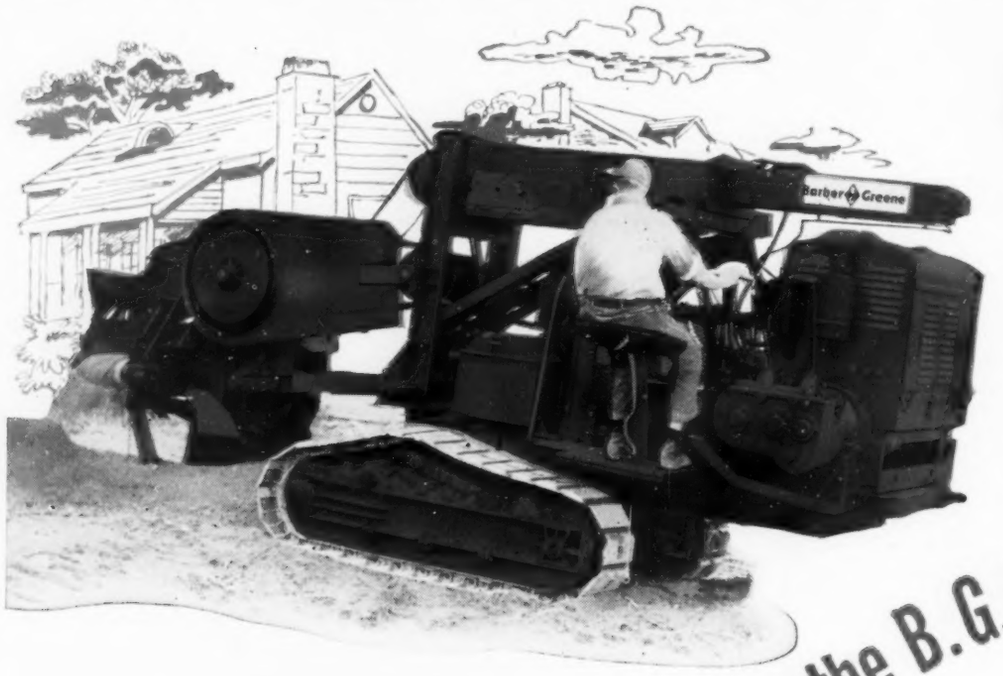
EP

X-30

THE ELECTRIC PRODUCTS COMPANY

1729 CLARKSTONE ROAD CLEVELAND 12, OHIO

Barber-Greene



720 Ditcher

For digging trenches 8" to 11" wide—up to 4 feet in depth. Digging speeds up to 32 F.P.M.; traveling speeds as high as 234 F.P.M. adjustable spoils conveyor discharges on either side. Three-position boom adjustable to dig close to obstructions. Simple B-G controls, easy-steering.

Two great new ditchers in the B.G. line!

These two new ditchers bring exclusive, time-proved B-G advantages . . . the B-G Vertical Boom that digs straight down, leaves no ramp . . . close-spaced, self-cleaning buckets that *cut*, like a milling machine, into toughest ground . . . the patented B-G overload Release for greater protection . . . *plus* special features for their types of service.

710 Ditcher

Digs trenches 5½" wide up to 42" deep. Digging speeds up to 32 F.P.M.; travel speeds up to 234 F.P.M. Vertical three-position boom digs close to obstructions. Cable-laying attachment available to feed cable and plow over the spoil in one continuous pass.

89

Ask your Barber-Greene distributor for full details on the B-G Ditcher which interests you — or write to Barber-Greene Company, Aurora, Illinois.

BARBER · GREENE COMPANY · AURORA, ILLINOIS

Constant flow Equipment

LOADERS · PERMANENT CONVEYORS · PORTABLE CONVEYORS · COAL MACHINES · BITUMINOUS PLANTS · FINISHERS · DITCHERS

NEWSLETTER
TELEPHONE ENGINEER

Fortnightly TELEPHONE ENGINEER ★ TELEPHONE ENGINEER AND *Management*

ON THE 1st OF EACH MONTH ON THE 15th OF EACH MONTH

NEWSLETTERS *on Alternate Weeks*

April 15, 1948

Dear Sir:

Hearing scheduled for Apr. 19 before subcommittee of Senate Committee on Labor & Public Welfare will take up bills to amend Fair Labor Standards Act. Subcommittee consists of Senators Ball (R., Minn.), chairman, Donnell (R., Mo.),Ellender (D.,La.), Jenner (R., Ind.), Murray (R., Mont.).

Two bills are now pending in Senate to amend Fair Labor Standards Act; - S.2062 & S. 2386. S. 2386, introduced by Senator Ball would rewrite Fair Labor Standards Act & make changes in Walsh-Healey Act.

Senator Ball's bill would not disturb 500 station-exchange exemption. Through industry committees it would authorize increase in minimum wage upward to 70 cents or downward to 50 cents depending upon investigations to be conducted by industry committees. In absence of "applicable order", minimum would be not less than 60 cents. Forty-hour week would be retained, with provisions for compensation at time & one-half for all hours worked in excess of that & for double payment as liquidated damages for violations.

* * *

FCC has postponed indefinitely its order in voice recording case, Docket 6787, which had been scheduled to go into effect Apr. 1. Commission stated that more time was required to reach determination on several matters discussed at informal conference in Washington, Apr. 6.

* * *

Editor of Minonk (Ill.) News Dispatch took close look at rate adjustment application of Minonk Tel. Co., decided telephone company should have its rate increase. Paper commented that rates, if granted, would be first raise given company since 1928. "If the rate was reasonable at that time," editorial said, "there is no question but what they are entitled to more now as costs of everything have increased greatly."

* * *

New York Public Service Commission indicated Mar. 27 it will grant Rochester Tel. Corp. 12% rate increase, to yield company about $533,000 additional net revenue per year. Opinion by Commissioner Maurice C. Burritt recommended that increase be given until Sept. 30, 1948, while commission continues its study of company's rates & operations prior to fixing final rates.

In January Rochester Tel. Co. filed petition for higher rates to yield about $2.1 million additional revenues annually. Commissioner Burritt concluded that company needs immediate rate relief, but that testimony thus far fails to support increase asked. He

said that 12% hike would not provide funds for construction, but should improve company's financial position. Commission has advised Rochester Tel. Co. that if new rate schedule is filed on basis of Commissioner Burritt's recommendations, it will consider making increase effective at an early date.

* * *

Annual conventon of Nebraska Tel. Assn., Hotel Paxton, Omaha, Mar. 30-31, attracted over 250 telephone men and women. All members of board of directors were reelected. Officers elected were: Neil Shreck, Bertrand, pres.; D. M. Davis, Aurora, vice-pres.; Geo. M. Kloidy, reelected sec.-treas.

Program presented leading industry speakers including: H. L. Frentress, gen. comm. mgr., N. W. Bell, Omaha; Thomas C. Woods, pres. Lincoln T. & T. Co.; Clyde S. Bailey, USITA exec. v.p.; Mayme Workman, Springfield, Ill.; John Knickrehm, chairman, Nebraska Railway Commission; John H. Agee, Lincoln; Mrs. Wm. Saltmarsh, Annandale, Minn.; Dr. Karl Arndt, Lincoln; James W. Cook, v.p., N. W. Bell, Omaha, and the undersigned.

Mr. Agee, during his address, notified conventioners of his plan to retire Aug. 1; gave audience inspirational address, outlining suggestions for maintaining industry's growth & prosperity.

* * *

Highlights: West River Tel. & Electric Co. converted Faith, S. D. exchange to automatic operation....Southeast (Mo.) Tel. Co. erecting new bldg. at Lilbourn; will convert exchange to automatic operation....Fairview Tel. Co., Glenn Plamann, Ks., raising funds to finance improvement program; plan new swbd. installation....McClellanville, S. C., granted franchise to George D. Bigbee, pres. Commercial Telephone System, Fairfax, S. C.; town soon will have telephone system.

Northern Tel. Co. to convert Creighton, Neb. to automatic service....Home T. & T. Co. announced mobile telephone service now is available for commercial users in vicinity of Fort Wayne, Ind. ....Citizens Tel. Co. will install automatic equipment at Dixie Erlanger exchange, Covington, Ky.....Charles F. Adams, Jr., pres. of Raytheon Mfg. Co., Waltham, Mass., has announced appointment of Hamilton Walter to newly-created position of coordinator of sales. ....Harry F. Lowe, partner in consulting engineering firm of Sloan, Cook & Lowe, Chicago, was one of principal speakers at Midwest Power Conference, Chicago, Apr. 7.

George H. Flagg resigned from Oregon Public Utilities Commission; succeeded by Chas. A. Rice....Illinois Commercial Tel. Co. presented 58 service pins to employees having 15 or more years of service....Spring Grove (Minn.) Coop. Tel. Co. to install new swbd. ....Sleepy Eye (Minn.) Tel. Co. installed new ringing system.... Lester Griffin joined Palmer (Ks.) Rural Tel. Co.....Max Leach, area engineer, Illinois Commercial Tel. Co. promoted to West Central area commercial supervisor.

P.S. This issue is largest (we think best) Spring Construction & Maintenance Number we have ever published. I would appreciate your comments after you finish reading. R.W.S.

Ray Smith

Ray W. Smith, Editor

ATTENTION
THE ANSWER TO
LIGHT DUTY EQUIPMENT

HERE'S A TRUCK SPECIFICALLY FOR LIGHT DUTY LINE WORK

4460-L

Look!
at the Features on
American 4460-L

- Pole Derrick
- Support Jacks
- Winch (Manual or Mechanical)
- Sliding roof
- Locker Compartments
- 2-man operation

Cut Your Mileage Costs with this American Standard Body

Have you ever seen a truck body specifically designed for light duty line work? *Look over the American 4460-L.*

This body has all the characteristics, except size, of its big brother, the DPL and B-4 line construction bodies. The 4460-L is approximately 1/3 the size of a DPL . . just right for light duty line work.

The 4460-L has everything needed for setting poles and stringing lines with a 2-man crew. One man operates the winch (manual or mechanical). The second man sets the pole with the aid of the pole derrick.

Note horizontal and vertical locked compartments on each side. Inside you have full body width and six swivel material hooks. Other features include support jacks, pintle hook, sliding roof, pike pole brackets and many others.

The 4460-L can be mounted on any make of truck chassis from 1/2 to 1-1/2 tons, with choice of 75", 90", or 104" body lengths.

Check your costs sheets and figure how much you can save with this 4460-L body. *We will be glad to answer any questions or furnish specific information on 4460-L, the body specifically designed for light duty line work.*

AFTER INSTALLATION, HERE'S THE TELEPHONE SERVICE BODY

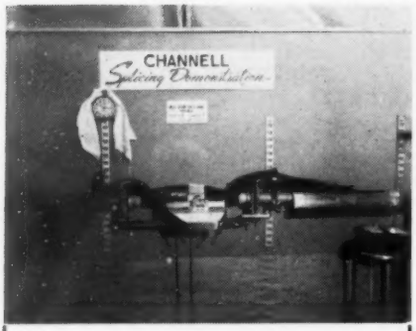
American LIU-76, standard with telephone companies for installation, maintenance and general service. Has many special features.

THE *American* COACH & BODY COMPANY

9503 WOODLAND AVE., CLEVELAND 4, OHIO

SALES and ASSEMBLY THE AMERICAN COACH AND BODY CO., CALIF. DIV., 432 FIFTH ST., OAKLAND 7, CALIF.
BAKER EQUIPMENT ENGINEERING CO., SUMMIT & NORFOLK STS., RICHMOND 11, VA.
OFFICES 350 MADISON AVE., NEW YORK 17, N. Y. INSURANCE EXCHANGE BLDG., DES MOINES 9, IOWA

ACB and



INCREASE PRODUCTION

A splice a day,
is the modern way.

New 1948 model splicing machine will be out June 1, 1948.

Reduce Construction Cost with the

Channell Cable Terminal

No stub,
No splicing,
No wiping.

Reduce Maintenance Cost

Repair those BROKEN POSTS back of face plate.

Terminal Repair Kits $1.85 each

CHANNELL SPLICING MACHINE

2415 Roanoke Road
San Marino 9, Calif.

SINCE 1889

NATCO

CLAY CONDUIT

The proved and standard Protection for Underground Telephone Cables.

Cheapest in the long run. Highest quality and a full line of shapes.

National Fireproofing Corp.

202 E. Ohio Street, N. S.
PITTSBURGH, PA.

ABOUT CONVENTIONS:—"Some people go to conventions because they want to learn all about the business in which they earn their living. They sit in at all sessions and listen carefully to what the speakers have to say. They visit the exhibits. They're looking for new ideas, and they find them.

Then there are those who attend so they can mingle with others who are there. They stay around hotel lobbies and ante rooms of the convention hall just visiting and swapping experiences with persons who have much the same business problems that they have. These people get a lot out of a convention, too.

And all of us know there are those who go to a convention to have a good time. They generally have it, too. These conventioners also profit because they get relaxation and a chance to forget their troubles. They have a good time and then go home ready to pitch in at their jobs.

But those who really get the most out of a convention attend for all of the foregoing reasons. They listen to convention speakers, 'chew the fat' with others they meet; visit the exhibits, and they generally have a good time with old friends and new acquaintances." **—Nebraska Telephone Association Bulletin, Geo. M. Kloidy, Editor.**

• • •

TAKE A $ BILL:—Out of your purse. Look at it. It has a picture of George Washington, a long number such as P 5 3 6 4 0 6 5 4 D, and a couple of signatures. We think this $ won't buy much. We'd like more $s. In bad moments, we're apt to think $s are of two kinds: scarce and scarcer.

To each of us, it's important how many $s we get. It's important, too, where they come from and it's easy to get mixed up on this.

Telephone dollars are of two kinds: "Investment dollars" and "income dollars."

Income dollars come from customers—the revenue that our Company receives for the service we furnish. About 50 cents of every dollar the customer pays for service goes to us employees in wages and salaries. Much of the rest of it goes for the everyday telephone expenses, such as supplies, taxes, and depreciation.

When the wages and these other expenses are paid, whatever is left is used to pay interest and dividends to investors and to put a little something by for a "rainy day." In 1947 interest and dividends totaled about six cents out of every dollar that came to us from customers, and surplus (the technical name for the "rainy day" fund) amounted to less than two cents.

Investment dollars come from those who use their savings to buy Bell System securities—either in stocks or bonds. This kind of dollar is used to expand the telephone system, to erect buildings, to buy switchboards, cable, desks, typewriters, ladders, and many other things of a permanent nature.

Investors' savings provide the telephone plant—the "tools" in a broad sense—that we use to give service to customers. Of course, if it weren't for those "tools" we wouldn't have telephone jobs. The total telephone plant runs into big money—it averages nearly $14,000 per employee."—**Reprinted from "The Michigan Bell."**

• • •

THE MOST AND BEST:—"As a public utility, we are charged with the responsibility of providing customers with the most and best telephone service at a reasonable cost. In order to fulfill this responsibility we must not only meet wage increases, advancing operating costs and make immediate additions to our plant, but we must also plan ahead and allocate large sums of money for future improvement and expansion."—**W. C. Martin, Georgia Manager, Southeastern Telephone Co.**

ACORN INSULATED WIRE

- Drop Wire
- Distributing Wire
- Bridle Wire

in ACORN'S "tough as nails" NEOPRENE jacket . . .

- Inside Wire
- Jumper Wire
- Cross Connecting Wire
- Plastic Insulated

with Enduring ACORNITE

32 years of specialization in the manufacture of communication wires has built an enviable performance record for ACORN Drop Wire.

ACORN'S exclusive carton packaging protects quality and conserves stacking space.

Write or wire for samples today

ACORN INSULATED WIRE CO., INC.

225 KING STREET, BROOKLYN 31, N. Y.

LEICH SALES CORP.
427 W. Randolph St., Chicago

LINDSAY SUPPLY CO.
4815 Superior Ave., Cleveland

PLAY IT

SAFE!

You're Twice as Sure with the Line that's "DOUBLE GUARANTEED"!

Every line-supply item that Kellogg stocks—down to the last nut and bolt—is backed by a "DOUBLE GUARANTEE". That means its quality is guaranteed both by Kellogg and by responsible manufacturers. It means you're protected against equipment failure, accidents, excessive maintenance due to faulty materials. You're SAFE with Kellogg—you're *sure* to cut maintenance costs—because every item has *got* to be the BEST!

Kellogg's complete line enables you to order ALL your supplies from *one* source. Saves you time, because there's only one order to write. And that order gets prompt attention by experienced telephone men. They see to it that you get the materials that best suit your needs.

Kellogg ships faster, too. Ships from over 100 distribution points all over the country . . . saves you time, shipping costs.

Put yourself in line for all these time and money-savings. Send your next order for line supplies to Kellogg!

3 Simple Steps

★ **You fill out just one order**
for ALL your line supplies.
Saves you time and work!

★ **Your order gets prompt attention**
from experienced telephone men.
No chance for slip-ups here!

★ **Your order is shipped quickly**
from the distribution point
nearest you. Fast, sure service!

KELLOGG Line Supplies

Everything in Line Supplies at Your Finger-Tips!

CONSTRUCTION MATERIAL

Anchors: Guy, Nail and Screw
Bolts: Carriage, Machine and Lag
Braces: Crossarm, Back and Angle
Brackets: House, Pole and Transposition
Cable: Telephone and Switchboard
Clamps: Guy, Span and Cable
Conduit: Clay, Fibre and Wood
Clips: Guy, Drop Wire and Test
Crossarms: Creosoted Pine and Douglas Fir
Guards: Cable, Hub, Manhole and Tool
Grips: Cable, Drop Wire and Buffalo
Insulators: Glass, Porcelain, Rubber
Kits: First Aid and Tool
Knobs: Porcelain and Knob Racks
Ladders: Extension, Step and Platform
Manhole Covers: Frame and Guards
Nails: Galvanized and Pole Dating
Poles: Creosoted Pine, Northern and Western Cedar
Rings: Bridle, Cable and Drive
Rods: Anchor, Duct and Ground

TOOLS

Augers and Blow Torches
Bolt Cutters and Digging Bars
Jacks: Cable and Pole
Linemen's Belts, Climbers and Straps
Pike Poles, Pliers and Pulleys
Screwdrivers and Soldering Irons
Tool Bags and Kits
Tree Trimmers and Wrenches

WIRE

Drop: Kellogg Bronze, Copper and Iron
High Tensile Line
Bridle and Tree
Jumper and Interior
Lashing and Bonding
Steel and Strand
Neoprene Bronze Drops and Bridle

POWER AND PROTECTION

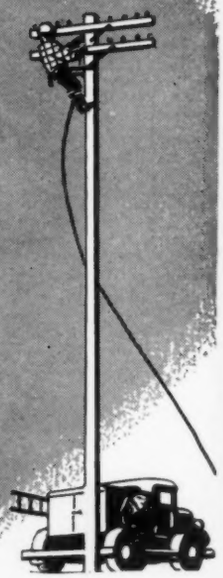
Arresters and Arrester Carbons
Arrester Blocks and Arrester Clips
Batteries: Storage and Dry Cells
Cable and Terminal Boxes
Fuse Wire: Bronze and Copper
Fuses for Arresters and Cable
Rectifiers and Rectifilters
Ringing Machines
Terminals

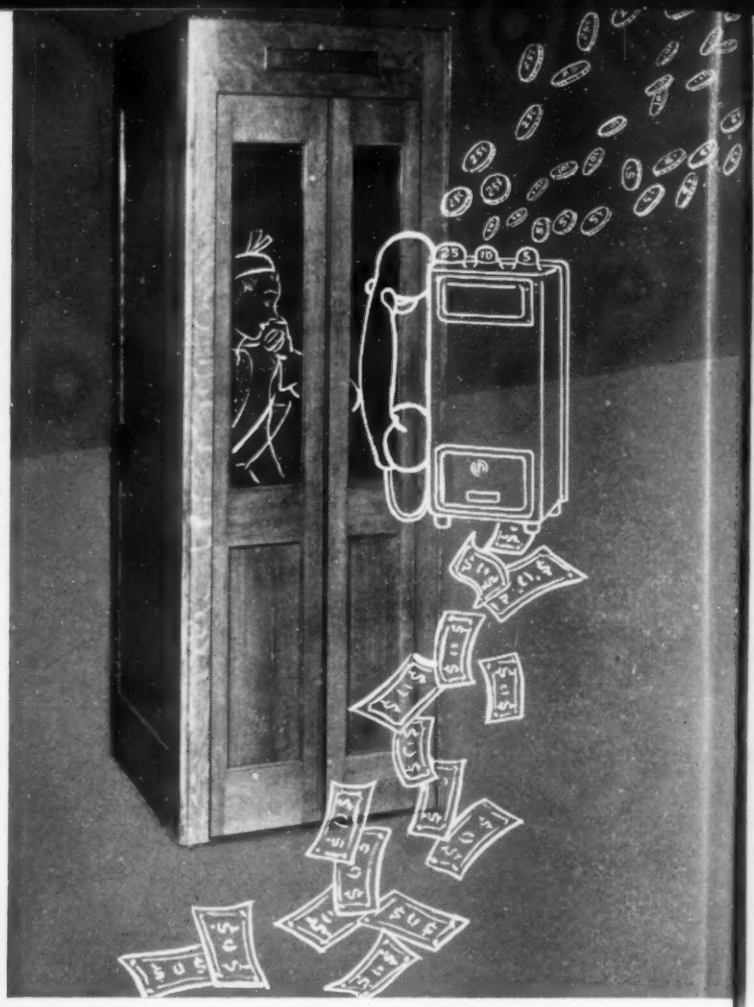
Your nearest Kellogg shipping point is never far away!

KELLOGG SWITCHBOARD AND SUPPLY COMPANY
6650 So. Cicero Avenue, Chicago 38, Illinois

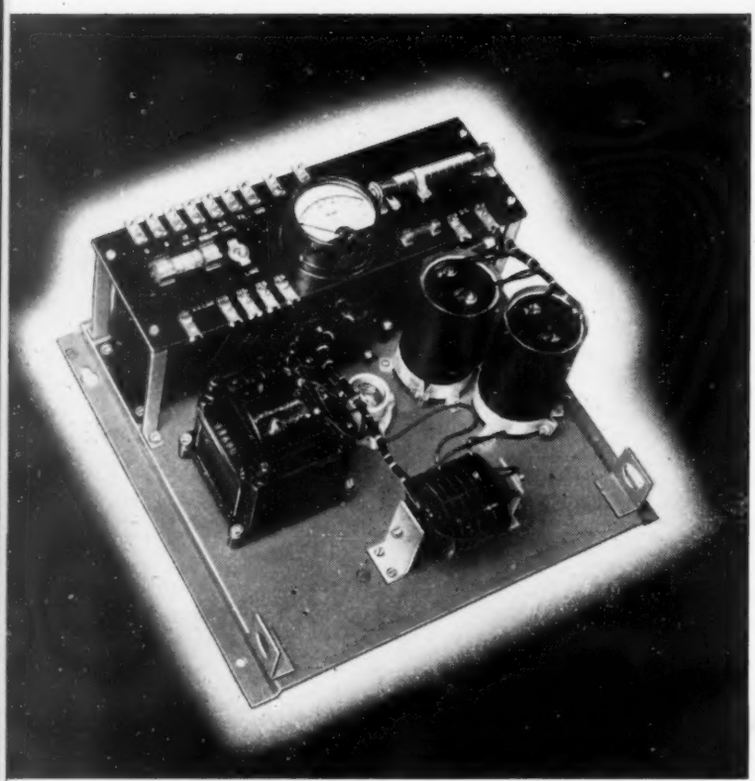
The Satisfaction Lasts
When You Buy Products

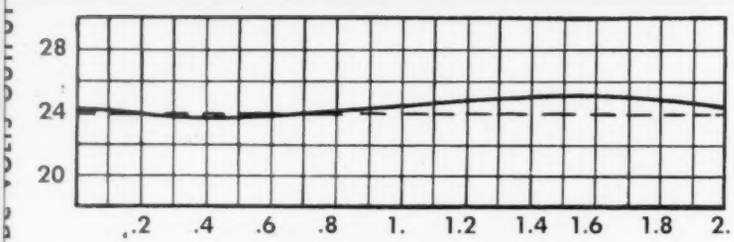
Recommended and Guaranteed by KELLOGG





Throughout the Country it has been proved over and over that pay station revenues increase when the public is given the privacy of telephone booths. Churchill Booths have the roominess, comfort and privacy which attract business. A popular example is CHURCHILL CABINET COMPANY'S No. 100 Booth, with automatic light and ventilator.

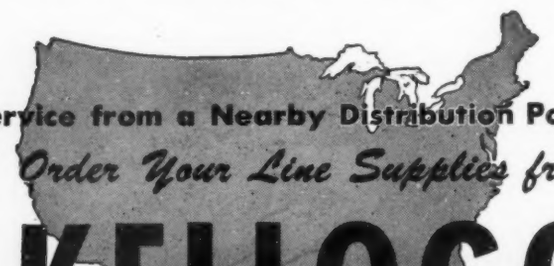




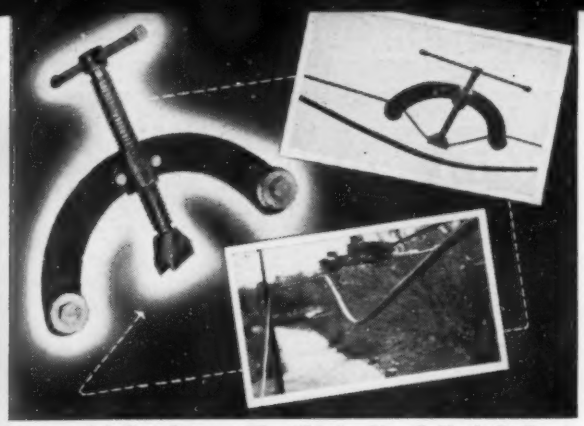
Steady D. C. Voltage required by switchboard lamps and telephones (especially dial) can always be assured with a RectiFilteR. Chart shows typical curve of DC output voltage under varying loads, proving that this RAYTHEON MFG. CO. unit provides stabilized output voltage regardless of AC line variations. With no moving parts, maintenance is very low.

There's three-way satisfaction when you concentrate purchases of line supply and construction materials at a single, responsible source: (1) The *quality* is right—all products are backed by the famous Kellogg DOUBLE GUARANTEE; (2) The service is right—orders are intelligently handled by experienced people; (3) *Delivery* is right—orders are shipped from the nearest of over 100 strategically located distribution points.

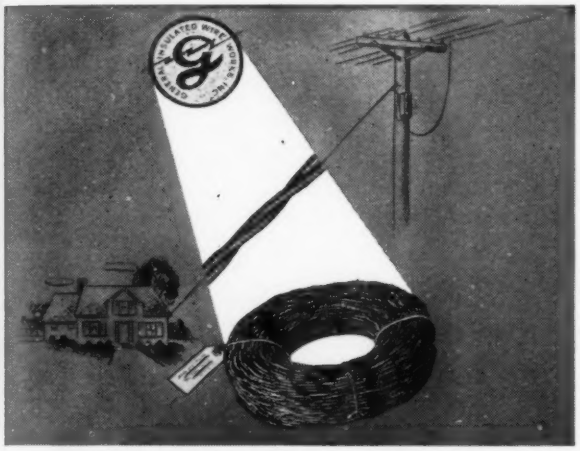
KELLOGG SWITCHBOARD & SUPPLY COMPANY
Branch Offices: Kansas City, San Francisco, St. Paul, Los Angeles
Factory and General Offices: 6650 S. Cicero Avenue, Chicago 38



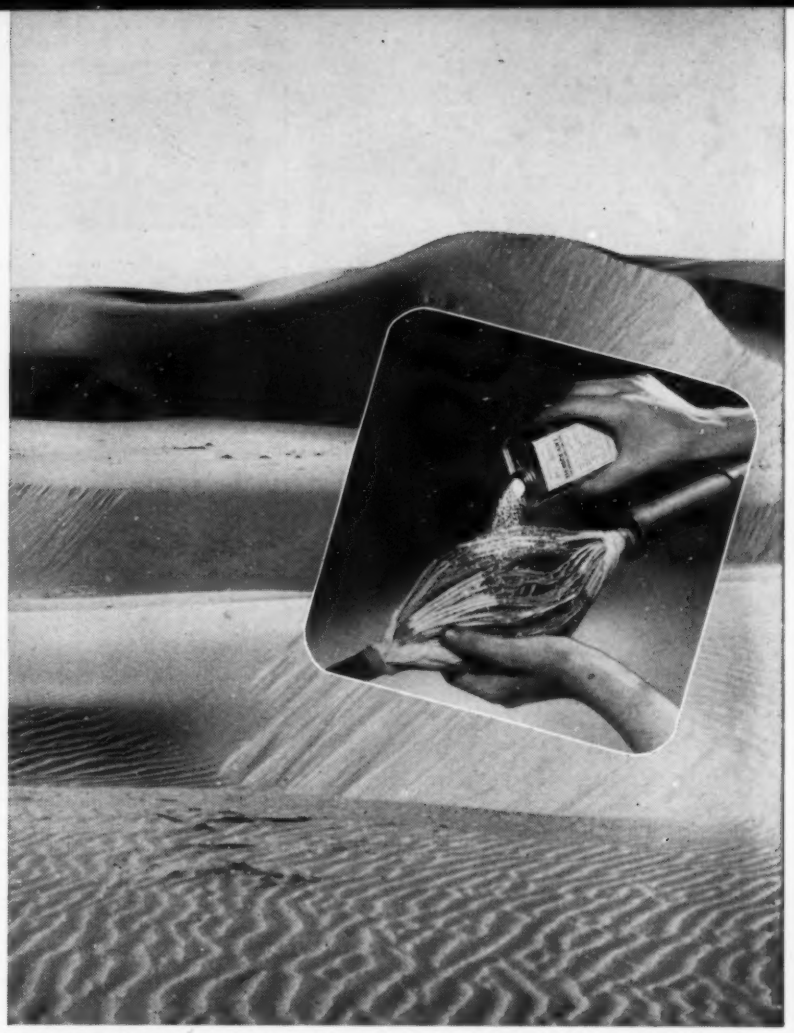
For Service from a Nearby Distribution Point
Order Your Line Supplies from
KELLOGG



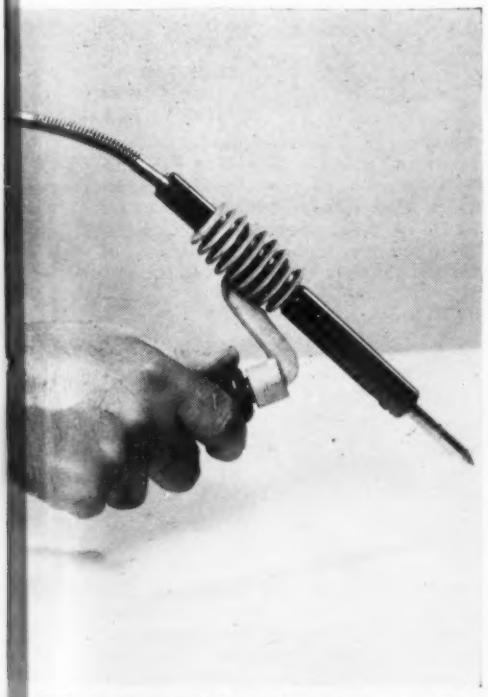
Time and Labor Saver. The "Little Giant" Slack Puller is ideal for taking up and holding slack in spun messenger strand and cable before cable is repaired. Enables one man to do in 54 seconds what formerly took 2 or 3 men 15 minutes. Made by CABLE SPINNING EQUIPMENT CO.



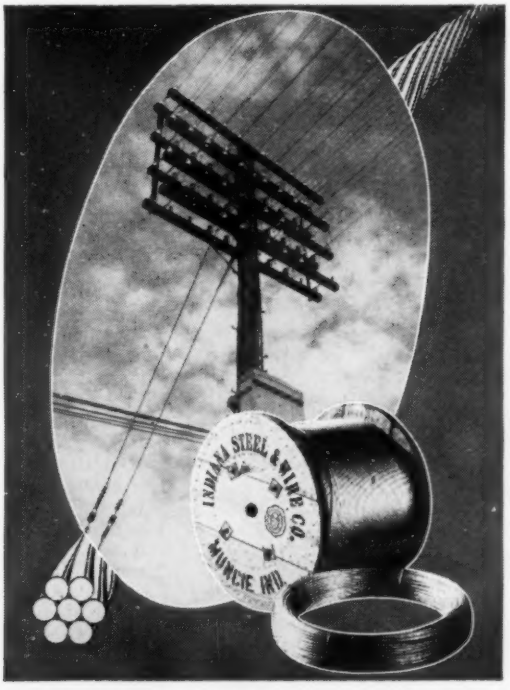
Increase Drop Wire Life 30% by using GENERAL INSULATED WIRE WORKS Bronze Drop Wire. This high conductivity wire is drawn of solid non-corrosive bronze and covered with special "armored" insulation for lasting, all-weather protection. It's flexible . . . easy to work with.



'Drier Than the Driest Desert! Drierite Dessicant is the safer way to dry out splices in lead covered cables. After splicing, just place a cotton gauze under the splice and sprinkle Drierite granules among the conductors. This W. A. HAMMOND DRIERITE CO. product absorbs all moisture, thus making the splice the driest part of the entire cable.



Makes Soldering Easier! Vulcan Counterpoised Electric Tool, made by VULCAN ELECTRIC CO., does more work, easier, because it's so perfectly counterpoised that the tip seems to be attracted to the work like a magnet. Handy plug tip with all parts replaceable.



The Time-Tested Steel Strand. A ductile, adherent zinc coating applied by the famous Crapo Galvanizing Process, provides lasting protection against corrosion in INDIANA STEEL & WIRE CO. Crapo Steel Strand. Its rugged strength minimizes maintenance expenses.

Dependable—In Any Weather! Hemingray Insulators are made to withstand severest weather. They defy rain, snow, sleet. Products of AMERICAN STRUCTURAL PRODUCTS CO., many of these insulators are still serving after 20, 30, and even 50 years. Shown is No. 9

on replacements and maintenance

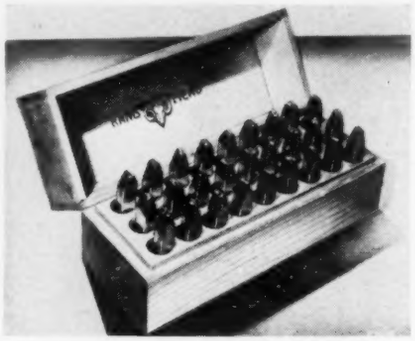
On overworked telephones such as house phones in hotels; on information desks; on double desks in busy offices; in brokerage houses and other troublesome locations, Koiled Kords can save you money. The strong neoprene jacket cannot ravel and prevents kinking and breaking. **Tinsel conductors** give added flexibility providing long wearing cord to keep your busiest instruments working and to save time and money by reducing replacements. Try Koiled Kords on your busiest locations.

Koiled Kords are distributed by independent telephone manufacturers and suppliers and, on the West Coast, by the Jewell-Summer Co., Los Angeles, Cal.

Koiled Kords
INCORPORATED
BOX K, HAMDEN, CONN.

New Products Showcase

For further information on New Products presented in this department, write New Products Editor, Telephone Engineer Publishing Corp., 7720 N. Sheridan Road, Chicago 26, Ill. All inquiries will be answered promptly.



A line of metal marking stamps with striking heads tempered by an exclusive process is anounced by the Acme Marking Equipment Co. The special tempering process is said to prevent chipping or mushrooming of the striking heads, thus assuring exceptionally long, useful life. Standard style Acme stamps are available for marking parts, tools, name plates, and machinery; reverse style for marking molds, forming dies, die casting and drop forging dies.

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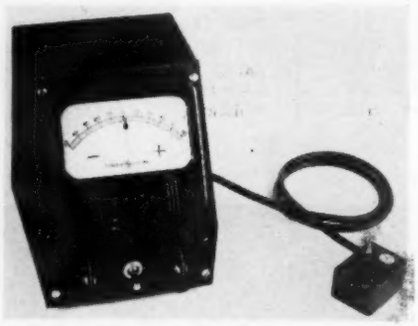


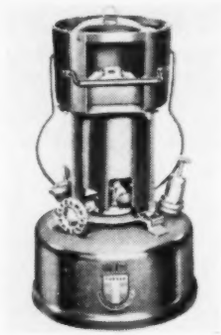
The Stevens-Arnold Electric Micrometer is a long life, dual purpose instrument. First, it can perform the usual measuring and gauging operations. Second, it is suitable for te'emetering where remote indication of small movements are wanted.

• • •

A new type, automatic, flashing red signal is now being used by police officials and fleet operators to mark accidents, stalled obstructions on streets and highways. Trade-named and sold by Signal Manufacturing Corp., Chicago, the unit will operate continuously for 100 hours on a standard 6-volt battery.

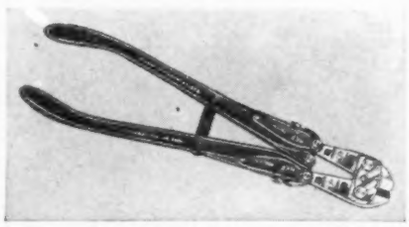
This new addition to the Heyco Underwriters' Approved Strain Relief group is furnished complete with protective spring. The spring model, protects the cord from excessive right angle bending where it enters the appliance chassis. The Heyco Strain Relief does not cut, or damage wire.

• • •



New low-pressure tinner's fire pot (No. 475) which is smokeless, sparkless, and sootless . . and safer, too, because it reduces the fire hazards of old-style charcoal burners . . . is now being manufactured by The Turner Brass Works, Sycamore, Ill. This new model is complete with Turner's exclusive "Carburetor Control" for more perfect combustion; also a flame control for exact amount of heat desired. A special soldering iron rest keeps points of soldering coppers out of direct flames.

• • •



New redesigned and improved line of Porter hand power cutters features 15 improvements. Of the improvements these are cited as being of particular benefit to users: curved toe-in handles which decrease arm-spread and wrist bend making an easier and stronger pull.

When there's no time for figuring elapsed-time toll records...

CALCULAGRAPH CALCULATES IT

...FASTER!
...ACCURATELY!
...AUTOMATICALLY!
...EASIER!

It's sound business practice in any exchange—small or large—to rely on CALCULAGRAPH to compute and record elapsed toll time accurately to the second. Thus, all the revenue due is charged to every toll call and operators are relieved of detail work that slows switchboard service. Available in several models and adaptable to any installation from flush mounting to portable pedestal types. Every CALCULAGRAPH features low initial cost . . . dependable service year after year. Complete catalog data on request.

CALCULAGRAPH COMPANY
SUSSEX STREET • HARRISON • NEW JERSEY

QUALITY ELECTRICAL PRODUCTS
PHILLIPS
CANADA since 1889

The International AUTOMATIC ELECTRIC Group

ATE

AUTELCO MEDITERRANEA S.A.T.A.P.

AE CO

..... Pattern for WORLD-WIDE SERVICE

The union of four outstanding telephone manufacturing companies under the banner of International AUTOMATIC ELECTRIC Corporation weaves a pattern of world-wide service that is second to none. From this well-knit organization come products of finest quality—telephone exchange equipment, telephone instruments, and telephone wires and cables that are supplied through the International AUTOMATIC ELECTRIC Group to telephone organizations everywhere.

We are also affiliated, in our Group, with telephone companies operating in seventeen of the United States—also in Canada and elsewhere. The experience of these operating companies can thus be brought to bear upon the engineering and installation of telephone plants of any size in any part of the world. The International AUTOMATIC ELECTRIC Group is prepared also to finance such plants if and as desired by any customer.

We should be glad to adapt our service to your specific needs. Simply tell us how we can serve you.

International AUTOMATIC ELECTRIC Corporation

1027 WEST VAN BUREN STREET, CHICAGO 7, U.S.A.

AUTOMATIC ELECTRIC SALES COMPANY, S. A.
22 Rue du Verger Antwerp, Belgium

Export Distributors For:
AUTOMATIC ELECTRIC COMPANY, Chicago, U. S. A.
PHILLIPS ELECTRICAL WORKS LIMITED, Brockville, Canada
AUTOMATIQUE ELECTRIQUE, S. A., Antwerp, Belgium
AUTELCO MEDITERRANEA, S. A. T. A. P., Milan, Italy
and other manufacturers
Selling Companies and Agents Throughout the World

READY SERVANTS
On Every Utility Transport Job

Four important features have earned for International Trucks their wide acceptance in the utility field.

First, is the quality of the trucks themselves—solid, rugged quality that pays off in long, trouble-free service and low operating cost.

Second, is the completeness of the International line—a gross weight rating range of 4,400 to 90,000 pounds.

Third, is the expert *specialization* of Internationals to their jobs.

And fourth is the quick availability of thorough, economical truck maintenance service from International Dealers and Branches.

For Internationals for your jobs, see your Dealer or Branch.

Motor Truck Division
INTERNATIONAL HARVESTER COMPANY • Chicago

Tune in James Melton on "Harvest of Stars." CBS Wednesday Night.

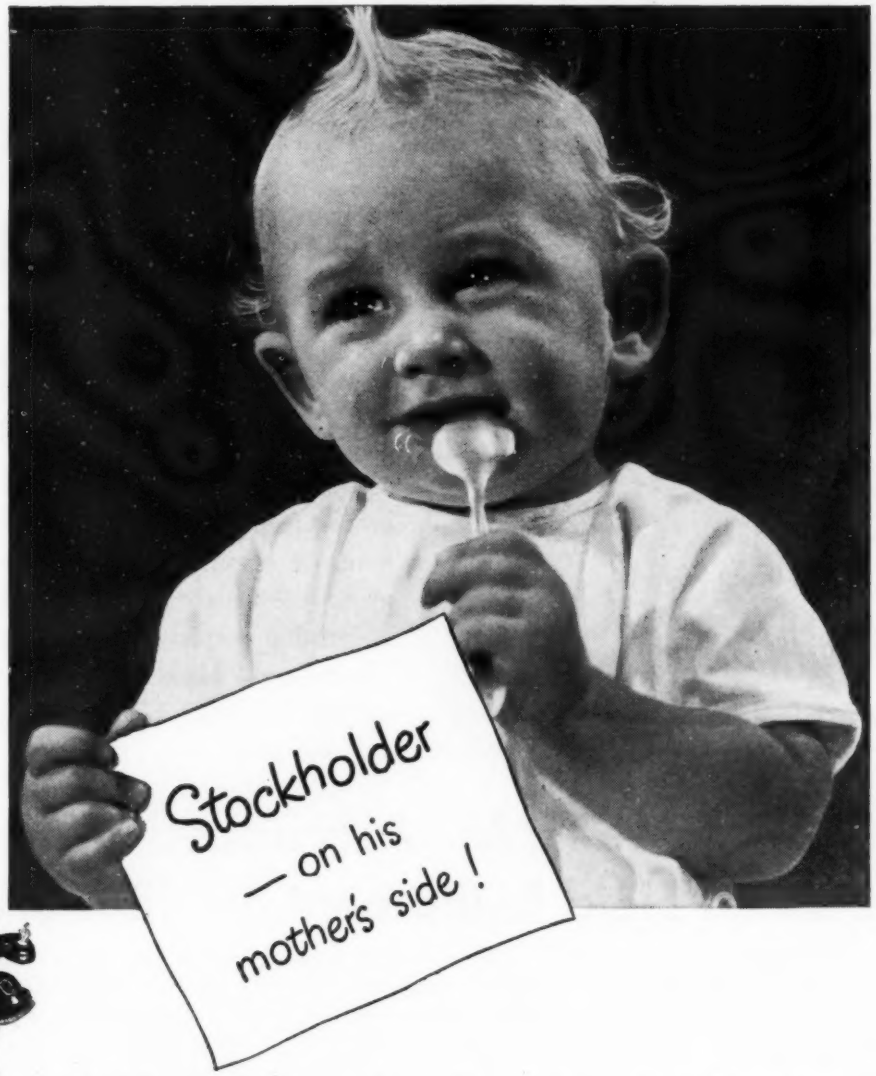
THIS EMBLEM IDENTIFIES GREAT TRUCKS
INTERNATIONAL

INTERNATIONAL Trucks

CAPTAIN of INDUSTRY ...in a small way

The widespread ownership of the telephone industry by the people it serves is the theme of the advertisement on the opposite page. It is appearing in national magazines during the month of April.

AN ADVERTISEMENT OF THE
BELL TELEPHONE SYSTEM



THIS cute little fellow wasn't born with a silver spoon in his mouth but his mother is a stockholder just the same.

For she's one of the thousands and thousands of mothers — young and old — among the 390,000 women who are stockholders of the American Telephone and Telegraph Company. They outnumber the men!

They are women in all walks of life. The majority give their occupation as "housewife." Many others are teachers, nurses, stenographers, clerks and sales people.

Tens of thousands of girls and women who work for the Telephone Companies either own A. T. & T. stock or are buying it out of wages.

No other stock is so widely held by so many people all over America—and there are more stockholders now than ever before. The total exceeds 723,000.

So you can see that this is a business that is owned by the people. It was built by the savings of the many, rather than the wealth of the few.

BELL TELEPHONE SYSTEM

"I Melted 60 Pounds of Lead in 10 Minutes With My MUTUAL LIQUID GAS No. 2 Furnace"

- ✓ No Moving Parts to Repair
- ✓ No Priming, Pumping or Generating
- ✓ No Coils to Carbon-Up
- ✓ No Smoke or Odor
- ✓ Safety of Modern Fuel
- ✓ Maintenance Dollars reduced to a few cents

MUTUAL'S No. 2 Furnace is a compact, light-weight unit that saves time and money on the job. Its quick heating qualities have made it popular with telephone men. Its many features include non-warping head, adjustable orifice and tube, removable handle and shield. Shield will accommodate 8" lead pot. Either butane or propane may be used.

Above are listed a few of the reasons why MUTUAL Liquid Gas Lead Melting Furnaces and Heating Torches are superior to makes which use slow, inefficient fuels. Liquid Gas vapors are drawn off from the liquid within the container by simply opening the valve. Liquid Gas Fuels (Propane and Butane) are about half the weight of gasoline or kerosene. ***(Flames can be adjusted from a blast [2300° F.] to handle flame.***

MUTUAL Advanced Telephone Field Equipment SAVE Man Hours

Desiged by telephone men, MUTUAL'S line of torches (using butane or propane gas) are perfectly adapted to fit the needs of linemen, installers and maintenance men. Mutual Torches are rugged but light and easy to handle . . . light instantly and will not blow out.

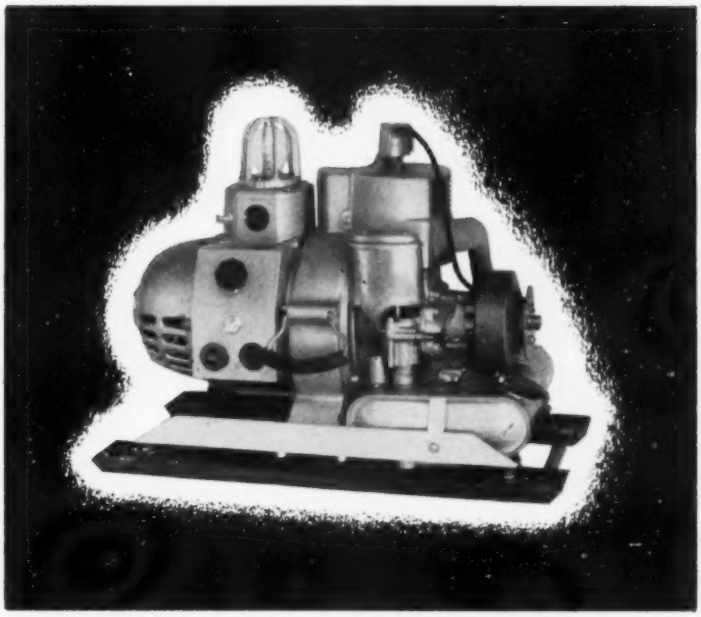
MUTUAL'S No. 4 Blow Torch is an ideal tool for the following uses: Soldering joints in line and bridle wire at junction poles, etc.; for minor soldering operations on subscribers' premises; for field use in conjunction with instrument repairs on rural telephones, for heating threaded crossarm bolts, guy clamps, which are so badly corroded that removing is difficult; for smoothing up wiped cable sleeves or removing solder from sleeves and many daily operations faced by telephone men. MUTUAL has a complete line of torches that will fit any need, large or small.

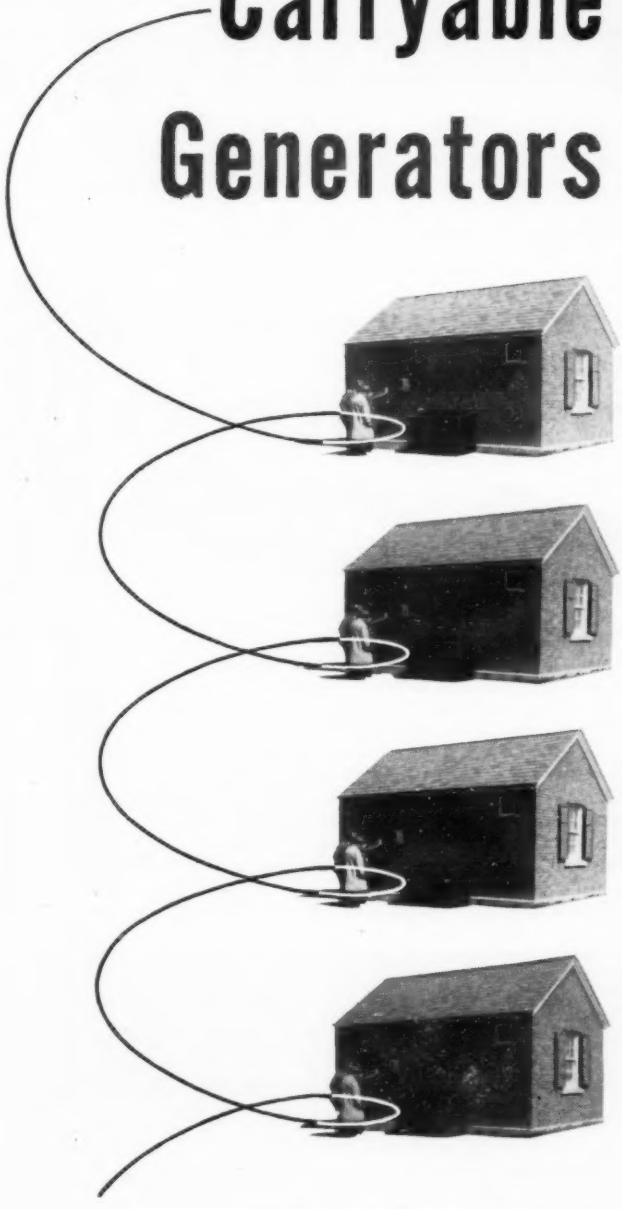
Order from your jobber or write us direct

Write today for Mutual's Illustrated Catalog

Mutual LIQUID GAS EQUIPMENT CO., Inc.
3600 WEST IMPERIAL HIGHWAY, INGLEWOOD, CALIF.

Have Portable Standby Power with Homelite Carryable Generators





When power goes out . . . rush a Homelite in.

There, in a nutshell, is your simple solution to serious emergencies.

Equipped with Homelite Gasoline-Engine-Driven Generators, you have an inexpensive standby power supply that can be whipped into action at all points of your system. Small and compact . . . light enough for one man to carry . . . a Homelite can be rushed by car or small truck to any of your central exchanges or relay stations. It will bring power *fast* to even the most remote locations.

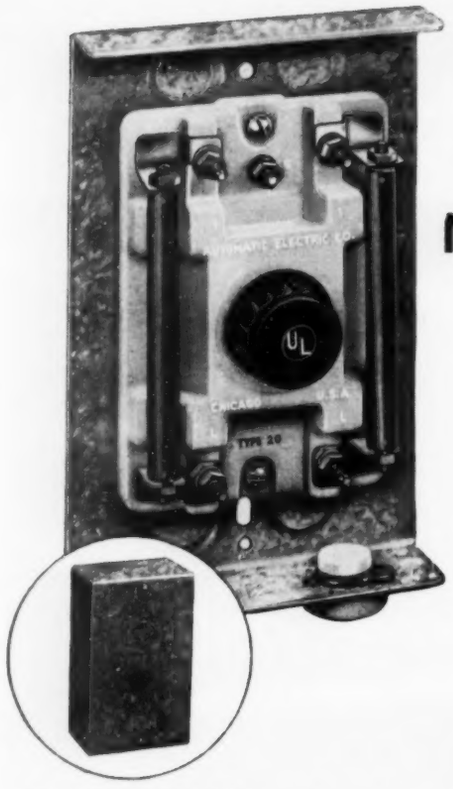
Working closely for years with telephone companies, Homelite engineers have developed a complete line of carryable gasoline-engine-driven generators that will meet all standby power needs. Let a Homelite Field Representative survey your system and show you how economically and effectively you can be protected against power failure or shortages with Homelite *Portable* standby power. Write today.

Homelite

CORPORATION

1204 RIVERDALE AVENUE, PORT CHESTER, NEW YORK

Manufacturers of Homelite Carryable Pumps Generators • Blowers • Chain Saws



Get Complete Protection *with* AUTOMATIC ELECTRIC'S New Type 20 Substation Protector

(Listed by Underwriters' Laboratories)

This new Automatic Electric Type 20 Substation Protector provides complete protection against every type of danger potential. Its carbon-to-carbon discharge surfaces, very accurately spaced, provide full and permanent protection at all times. The one-piece heavy porcelain base assures ample spacing between terminals, and between discharge blocks and fuses and terminals. Geometric centering of discharge blocks provides greater mechanical strength and greatest effective dielectric strength. The removable hot-dip galvanized cover has 3/4" clearance—a further safeguard against high potentials.

Cat. No. SB-91—With cover, for outdoor use—7 amp. fiber fuses.

Cat. No. SB-88—Without cover, for indoor use—7 amp. fiber fuses.

Other fuses available to order.

AUTOMATIC ELECTRIC

Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . . . Machine Switching Automatic Dial Systems
Makers of Telephone, Signaling and Communication Apparatus . . Electrical Engineers, Designers and Consultants

Distributors in U. S. and Possessions

AUTOMATIC ELECTRIC SALES CORPORATION, 1033 W. Van Buren St., Chicago 7, U. S. A.
Export Distributors: INTERNATIONAL AUTOMATIC ELECTRIC CORPORATION

A Truly Great *All Aluminum* INDUSTRIAL LADDER

TYPE TF2

For industrial use . . . for great strength with light weight . . . for ease of handling . . . Duo-Safety's sturdy Type "TF2" all-aluminum (duralumin) ladder, with exclusive, indestructible Channel Rail construction, provides the perfect answer. Type "TF2" is available in all standard ladder lengths.

channel rail

Free A colorful file catalog illustrating Duo-Safety's complete aluminum ladder line is available upon request.

DUO-SAFETY LADDER CORP.

809 NINTH STREET, OSHKOSH, WISCONSIN, U. S. A.

FOR FLEXIBILITY AND LONG LIFE IN TELEPHONE CORDS

Use Commercial

Only top grade materials go into Commercial Telephone Cords. They are fabricated by expert craftsmen. Extra precautions are taken to insure flexibility and protection against moisture. And in service they prove the resulting superiority.

So no wonder more and more telephone companies are standardizing on Commercial Cords. Try Commercial next time you order and you will too. Prompt delivery on all standard types, or any special type you may require. Remember . . . Commercial means

ECONOMY • QUALITY • SERVICE

Commercial Cord
AND SUPPLY COMPANY, INC.

26 East Main, Clifton Springs, N.Y.

*Order by Code Number or Submit Sample

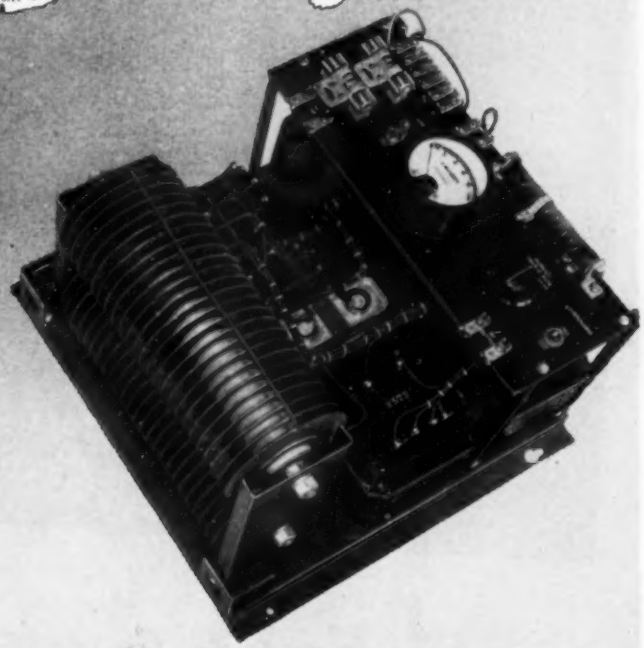
WHY MAKE A JOB OUT OF BATTERY TENDING?

HELP WANTED
BATTERY SITTER, full time, to mind storage batteries, keep them charged to constant potential. Must be completely dependable and capable of taking all responsibility without supervision. Previous experience essential.
Phone TEL. CO.
SWITCHBOARD & junior clerk
7-8731
Positions Wanted-Men

RAYTHEON RECTICHARGERS

KEEP THEM FULLY CHARGED *Automatically*

Raytheon RECTICHARGERS function constantly and efficiently year after year. They have no moving or expendable parts . . . nothing to wear out. They keep batteries fully charged, prevent over-and-under charging, eliminate voltage variation, increase battery life, reduce battery maintenance to infrequent inspection. The widespread use of Raytheon RECTICHARGERS in unattended exchanges is your best assurance that you can use them to save man-hours and operating expense wherever batteries are used. Your regular equipment supplier has them in stock in capacities from 1 to 24 amperes.



GET RID OF DIRT IN DIAL EXCHANGES

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OVER 40 YEARS SERVICE TO THE TELEPHONE INDUSTRY

EDITORIAL

The Importance of "Know How"

ABOUT the most important ingredient in any business is that thing called "know how", which can be defined as the knowledge of how a thing can be done best, coupled with the ability to so do it or to get it done.

It was this "know how", as much as anything else, that made possible the miracle of production performed by American industry during the war. Raw materials and manufacturing capacity alone could not have done the job.

Many countries have plenty of raw materials, natural resources and available labor—many have raw materials the United States does not possess, and from which it was shut off during the war. But they lack the "know how" of American management and labor—and that is what turned the trick in the U. S. A.

There is always need for this "know how" in any industry, including the telephone industry. The older an industry becomes the more it needs this ability to know not only what to do, but also how best to do it or get it done.

The telephone business was a great deal simpler in its earlier days than it is now. It needs more "know how" now than it needed then.

Consider the history of the development of telephone equipment and plant. The original magneto switchboard was a fairly simple proposition, and the work of erecting poles and stringing wires on them was not complicated. Almost anybody could learn in a short time how to deal satisfactorily with plant and equipment of the early days.

But, as time went on, telephone people had to learn how to maintain and operate common battery boards, later becoming multiple boards; then, in many places, automatic equipment. They had to learn how to put their wires, in cables, underground. They had to learn how to build long haul toll lines that would provide satisfactory transmission over thousands of miles. As time went on, they had to learn how to put many of those toll lines underground. Many other instances could be cited of the increasing need for "know how" as the industry developed from its earlier and less complicated stages.

Now there is need throughout the industry for even more and new kinds of "know how". There are now being introduced into the business many new things, most of them not even thought of in the earlier days. They include such things as carrier equipment, mobile telephones, various types and uses of radio—even the use, in connection with telephone service, of recording mechanisms.

As these and other new things come along, the industry must develop people who know how to adapt them to commerical telephony; how to manufacture them, install them, maintain them, and make them serve their respective purposes in the telephone industry in the best possible way.

It is possible for these things themselves to be developed faster than people can be developed in the industry to deal with them. That, in fact, may be taking place right now—there seems to be too few people in the industry now who are expert in the use of new things available to the industry now.

The existing rapid development of new things available for the telephone industry means that there must also be developed for or brought into the industry people with the "know how" to deal with all these new things. Unless that is done the integration of these new things into the industry may be seriously retarded.

There is as good opportunity in the telephone business now for young people as there has ever been before—probably better—if they have or can develop the "know how" the business needs.

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The following is our engineer's routine report:

"The customer advised us that the new XY installation at Worthington had frequent overloads, due to heavy holiday traffic. It so happened that on this same morning, a truck arrived from Rochester, with XY Equipment for installation at Rural Valley, and it was a matter of seconds for us to figure how to provide relief at Worthington immediately. This was accomplished by taking two line finders, two first selector plates, and four switches off the Rural Valley truck, driving out to Worthington, and making a two-link addition (which was sufficient to relieve the load), in about 30 minutes. Mr. Schotte, Manager of the Kittanning Telephone Company, was amazed and very well pleased with the ease and simplicity of adding to XY Equipment."

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Telephone ENGINEER and MANAGEMENT
THE NATIONAL TELEPHONE MAGAZINE

WASHINGTON Bureau REPORTS

BY ROLAND DAVIES and FRED HENCK

COMMUNICATIONS INDUSTRY has key role in both civil defense planning and overall surveying of defense requirements. . . . FCC stages conference on telephone recorder. . . . Membership struggle looms up between CIO Telephone Workers Organizing Committee and Communication Workers of America.

FOR THE SECOND time in less than a decade, national defense preparedness has become a paramount consideration in the nation's capital. And in both civil defense planning and the overall surveying of the country's defense requirements, communications is playing a key role —even more so than in the days preceding World War II.

It is difficult—in fact, almost impossible—to separate the wheat from the chaff in the rumors of war. Probably no one on the face of the earth can say with assurance whether or when the United States will be again plunged into a world conflict.

But one fact is obvious. Additional personnel for the armed forces, procurement both for immediate defense needs and "pilot" orders to keep industry geared, and generally accelerated defense preparedness are certainties, whether or not we get into a war. Those items will affect the telephone industry, now and for some time to come.

Generally, the facilities of the telephone companies needed for current requirements of the enlarged armed forces in the speed-up of defense preparedness are felt by authoritative military sources to be adequate at the present stage of the game. Production of military equipment in the communications field likewise can be handled speedily by the nation's manufacturing establishments when the "green light" for the refurbishing of the armed services' supplies and stockpiles is given through allotment of funds by Congress.

Other developments on the national defense front include:

(1) Leighton H. Peebles, wartime Chief of the Communications Division of the War Production Board, has been named communications consultant to the National Security Resources Board, top-level planning agency in the military establishment. Mr. Peebles later is expected to be designated chief of the NSRB Communications Division and will have a small staff to aid him in the planning of the coordination of military and civilian industrial mobilization to be carried out in event of war. At the appropriate time, it is expected, Mr. Peebles undoubtedly will have organized advisory committees from the different segments of the communications industry.

(2) Russell J. Hopley, President of the Northwestern Bell Telephone Co., is now on leave of absence from the company to serve in Washington as Director for Civil Defense Planning. He has stressed that "communications in all its forms will be the backbone of civilian defense operations". Mr. Hopley plans, after his first conferences with governors and mayors and following the organization of his staff, to call in advisory groups from the various parts of the communications industry to map out the plans for the roles of their different facilities.

(3) For the present, under the projected limited draft for the armed services, the feeling is that the training camps and establishments still functioning or on a stand-by basis are believed adequate, and their communications facilities are already in operation or can be quickly reconnected.

(4) Another probability is that the affiliated unit plan of the Signal Corps will undoubtedly be accelerated by the current situation. Telephone companies have responded well to the plan. The Signal Corps, incidentally, needs some building up of technical officer strength, and its enlisted strength is a little below the peacetime authorization.

(5) Finally, the belief is that if Congress confines the proposed limited draft to single non-veterans between 19 and 25, there will be virtually no impact upon the communications companies, both because of the ages involved and the expectation that the wartime exemptions of skilled workers in essential industries

probably will be invoked on a broader scale.

FCC Stages Conference On Telephone Recorders

THE FCC HOPES to gather sufficient data to settle finally three issues remaining from the "final" order on telephone recorders issued late last year at an informal conference which was slated to be held Tuesday, April 6.

The Commission scheduled the following questions to be considered: the request of the Bell System that telephone companies have the sole responsibility for the furnishing, installation, and maintenance of the automatic tone warning device; the reasonableness of the Bell System's proposed tariffs for the recorder-connector unit; and the reasonableness of the proposed arrangements for permitting sales demonstrations of recorders.

Judging from the steady flow of objections and petitions from the recorder manufacturers, it is expected that considerable fire will be centered on the A. T. & T.'s suggestion that Bell companies will set an installation charge of $5 for the warning-connector unit and a monthly rate of $3. In a letter in January, Assistant Chief Engineer J. B. Rees of the A. T. & T. said the proposed rates will not be fully compensatory at the start.

In addition, the recorder makers have criticized the proposal of the A. T. & T. for similar charges for a portable warning-connector unit to be leased to recorder salesmen. Besides the $3 monthly charge, there would be a fee of $5 for a 30-day maximum to cover a jack arrangement on the subscriber's premises for testing the recording device. If the subscriber should order permanent installation of a tone warning device when the jack is removed, there would be no additional installation fee under the Bell System plan.

There has been little objection to the proposal that the telephone companies be responsible for furnishing and maintaining the warning-connector equipment. In general, the recorder manufacturers, after finally accepting the FCC decision that a tone warning signal will be necessary, have been willing to have the telephone companies furnish the warning-connector unit.

Split Second from Eternity!

SHAKEN EMOTIONALLY by the close brush with death encountered by "a youth and his girl" racing in their automobile to beat his train to a crossing, a railroad fireman of the Union Pacific Railroad directed this poignant plea to the car occupants through an open letter published in the *Omaha World-Hearld.*

"I don't know who you are, it's true, but I do know you were scared to death Sunday evening near 9 o'clock when you drove your car across directly in front of a speeding passenger train. It was so close that I, in the cab, could see the young girl (your sweetheart, I presume) throw her hands up in front of her face and cringe up against you in stark horror.

"If I were that young girl, I'd pull away from you, fast. You don't have good sense, son. You probably say you love her. I wonder. Those we love we try to protect. But not you.

"Wouldn't that have been a nice Christmas present to hand your mother—a broken and battered body. And how do you think that we in the cab of that engine would feel. We are human beings, too. We have young ones waiting home for us to return. We, too, could have been killed.

"You and your girl were one second from eternity Sunday, son.

"I hope you read this and know it means you, and that your girl will, too. Next time you go driving around, stop and look. We don't want to hit you, but we are helpless, as we cannot swerve away from our given rail.

"If I were you, son, and you, too, sis, I'd thank God for that split second He granted you Sunday evening.

"I said a prayer for all when I realized you were going across. Perhaps that's what saved us all.

"Now think it over, both of you. And I'll bet you are both still shaking in your shoes.

"And please, for God's sake, don't try it again."

The writer of this moving plea for safety, did not sign his letter, and it was not until much later that his identity became known. A neighbor, learning that he was the author, wrote to the Omaha newspaper telling of her discovery because, she said, "it was too good a story to hold on to."

The next day the Union Pacific fireman, fearing reprimand from the railroad, took the day off, donned a white shirt and went to face the music in the office of the railroad's safety engineer. It was sweet music, for the road's executive has been probing frantically to learn the name of the writer of such a great testament in behalf of safety.

It turned out that the fireman was Chester E. Beltz of Council Bluffs, Iowa. He is a 38-year-old father of a boy and a girl. After being "unveiled," he declared: "If it (the letter) saves one life . . . I'm glad." . . . We publish his letter in the hope that many telephone men will remember its message the next time *the urge to save a second moves ahead of common sense.*

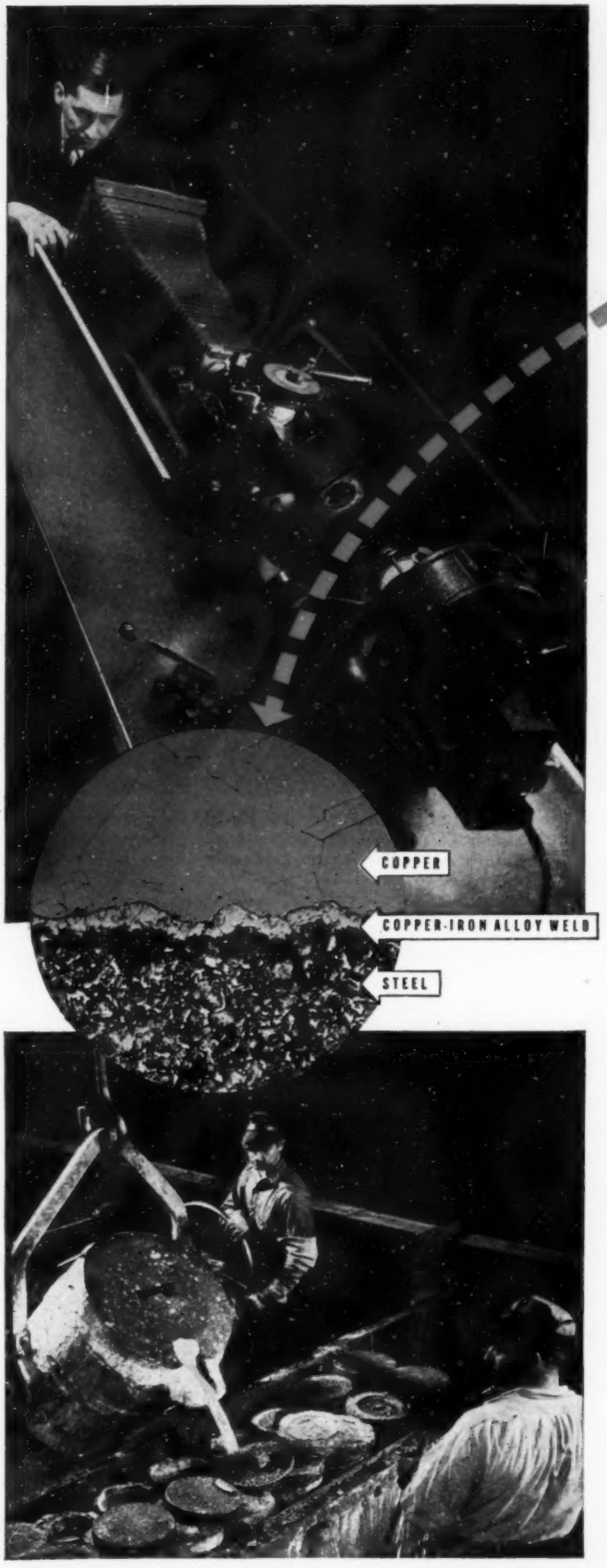
CIO Union Sets Sights High

THE TELEPHONE industry, particularly the Bell System, appears to be in for participation as a battleground this spring in the struggle between the independent Communications Workers of America and the CIO Telephone Workers Organizing Committee to bring home the most bacon for their memberships, thus adding a potent weapon to their respective organizing arsenals.

Thus far, the CWA divisions, which are bargaining individually with the Bell companies whose workers they represent and are not seeking settlement on a nationwide basis as the union did last year, have come out only generally for some sort of a wage boost. But the American Union of Telephone Workers (former Long Lines Federation), once a bulwark of the National Federation of Telephone Workers, the present CWA, and now an affiliate of the CIO, has not been so shy. At its convention, the AUTW came out not only for a 30-cent hourly increase across the board but also for a 35-hour workweek at pay based on the present 40-hour week.

The two demands are separate and distinct. Thus, a worker earning $1 an hour—for easy arithmetic—would have his pay boosted more than 44 cents an hour under the AUTW de-

(*Please turn to page* 87)



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Copper and Steel are Inseparably Welded by the Copperweld MOLTEN-WELDING PROCESS

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To produce this perfect weld, molten copper is poured around a heated steel billet centered in a mold. Temperatures and casting conditions are critically controlled. As a result of this basic Copperweld operation there is an interpenetration between the copper and the steel forming a permanent molten-weld between the two metals.

The permanence of this metal-to-metal weld is attested by the dependable performance of millions of miles of Copperweld wire installed during the past thirty years—on long span power crossings over ravines and rivers—on vital communication lines subjected to desert sun or Arctic cold—on railroad signal circuits—and on many other applications where the conductivity and corrosion-resistance of copper and the strength of steel are required.

For highest standards of efficiency at lowest annual cost, use Copperweld Products. Engineering data will be sent on request.

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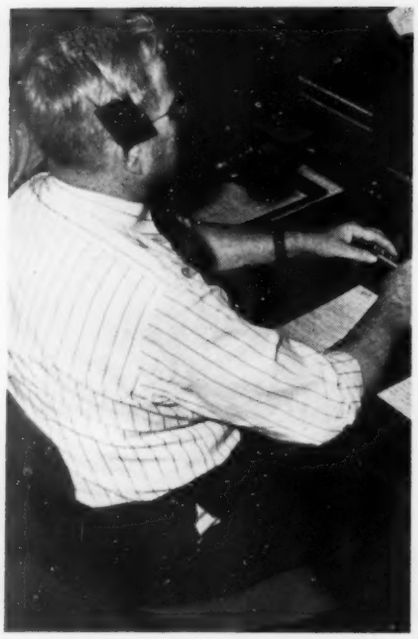


Spring Construction a

"With foreign situation becoming more critical, telephone companies should lose no time in planning and putting into execution a construction and maintenance program that will give outside plant a new lease on life."

BY B. C. BURDEN

Will We Be Ready?

ABOUT THIS time of year housewives begin thinking about beating the life out of the family rugs and telephone plant men start planning their spring and summer construction program. With the foreign situation becoming more critical by the hour, it would appear to be good business for Independent plant men to lose no time in planning and putting into execution a construction program that will give outside plant a new lease on life. If another world conflict comes before snow flies, we should have our telephone plants in the best possible condition. Our telephone system played an important part in World War II. Let's have it ready for No. III, should it come.

Field Inspection

NO CONSTRUCTION project is better than its preliminary planning. With supplies still critical and the extra urgency for restoring telephone plants to a high state of efficiency in view of the possibility of war, it is doubly important that plant conditions be accurately evaluated and plans drawn for effecting necessary repairs, replacements, and for needed new construction. It is not good management to approach the spring and summer construction season by simply ordering a quantity of various types of materials and then going out and making repairs on a hit and miss basis.

In the smaller exchanges a prelinminary survey of plant condition can be made rapidly and conveniently by one man and a driver. It should not be necessary to even get out of the car on much of the inspection work. Some sections of line will of course require pole-to-pole inspection and occasional examination of wire or cable. With one man writing down details while another drives a substantial amount of plant can be covered in a few days. The inspection details should be recorded on some convenient form. This form is of immense value

and Maintenance Program

No construction project is better than its preliminary planning. With supplies still critical, it is doubly important that plant conditions be accurately evaluated and plans drawn for effecting necessary repairs."

"No spring or summer construction program should be undertaken without a preliminary survey of the work to be done."

when used in conjunction with city and rural maps enables the inspection details to be readily identified in the office. Proposed work can then be drawn up on working sketch maps which should show the work to be done and the amount of material required. *Fig.* 2 is a typical working sketch map showing repairs to be made on rural plant.

Inspection Procedures

POLE REPLACEMENTS may be determined either by digging around the base of the pole and checking the amount of cross section remaining, or by pike pole tests. Pike pole tests give satisfactory results and are now extensively employed in determining pole condition. Cable plant which is badly in need of repair should be examined with a view to its ultimate replacement, but not overlooking the fact that extensive repair work may be required because of the difficulty in getting prompt shipment of cable at this time.

Iron or steel wire which shows corrosion but which is not actually pitted will generally prove worth leaving, particularly if it does not contain many splices. Whether or not replacement of rusty iron wire should be made will also depend on the amount of work to be done on a section of line. When extensive repairs are necessary, such as replacement of a large number of arms and poles, it may be desirable to replace rusty wire which otherwise might be left in service for a few years.

Planning the Program

AFTER THE plant inspection is completed, the plant manager will need to plan the order and manner in which the work will be undertaken. If extensive repairs are involved, some thought should be given as to whether or not the existing plant should be replaced in kind, repaired, or whether new type plant should be substituted. For example, should open wire be replaced by cable, aerial cable by underground cable, etc.? It may be desirable in some cases to place new plant on an improved route and to abandon the plant on the old route. It may also be desirable to place plant on a new route as a circuit relief measure.

In planning work involving cable plant replacements, the possible need

Here in order of importance, Mr. Burden outlines a complete Spring Construction program, providing telephone companies with field-tested ready-to-use suggestions.

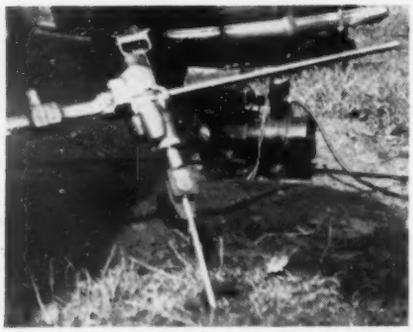


Fig. 1—Driving down a screw-type anchor with a Kamo electric motor.

for additional capacity should not be overlooked. A cable record study will indicate present cable pair loading and this coupled with a knowledge of growth trends for a given section of the city or rural area should indicate the spare capacity and growth margin that should be included in any new cable to be placed. A section of a cable study map is shown in *Fig.* 3.

Cost Studies

IF THE EXPENDITURES proposed for any project are large, it may be desirable to make a cost study to determine which of several plans are most feasible from a cost standpoint (other factors being equal). The cost study should not overlook the fact that it is the annual rather than the initial cost which should, in most cases at least, influence a choice when several methods are under consideration. *Fig.* 4 illustrates how two plans, one involving open wire and the other aerial cable might be set up in order to compare the annual costs of the plans. If the annual charges are about the same, then other factors, such as effect on service; appearance; flexibility; etc. should influence the selection. These factors should of course appear in any study and weighed against costs.

When a plan has been selected it will be necessary to determine the quantity of materials required and their cost. The larger companies, require the preparation and approval of cost estimates before work is undertaken. These estimates show the effect of the proposed work on the book accounts. Proposed expenditures should be classified with respect to materials; supply expense; labor; overhead; etc. "Plant displaced" is another factor that must be taken into account. A typical authorization estimate form is shown in *Fig.* 5. With the project plans completed and decisions as to construction methods worked out, orders should be placed promptly for needed materials, for construction tools, and arrangements made for the necessary construction forces. Manufacturers should be advised of the dates that material deliveries should, if possible, be scheduled.

Tool Requirements

NO SPRING OR summer construction program should be undertaken without some thought being given to the availability of adequate tools of the right type to properly execute the construction work. It is "spendthrift" economy to use inadequate, outmoded, or improperly maintained tools in these days of high labor costs. Missing and broken tools should be replaced. Dull tools should be resharpened. Poorly maintained tools will eat up their cost many times over on a single project due to the greater time required in using them.

Many telephone companies are finding that they can now save money by the use of motor driven tools even though such tools are relatively high in first cost. Motorized hole digging by means of the Kamo type electric drill or with truck mounted diggers is fast becoming a "must" with Independent telephone companies. Pneumatic tree trimmers are also proving their worth as labor saving devices.

Some companies are equipping their construction trucks with 2500 to 3000 watt, 115-volt, 60-cycle, a-c gas engine driven generators as a means of powerizing such operations as sawing, drilling, tool sharpening on the job, etc. One and two man light weight engine driven chain saws are proving particularly popular for tree trimming purposes. Two men with a chain saw (*Fig.* 6) can do the work of ten men with crosscuts and do it better and with minimum effort.

Pole Line Design

THE DESIGN of pole lines which are up for major replacements should be checked to insure that

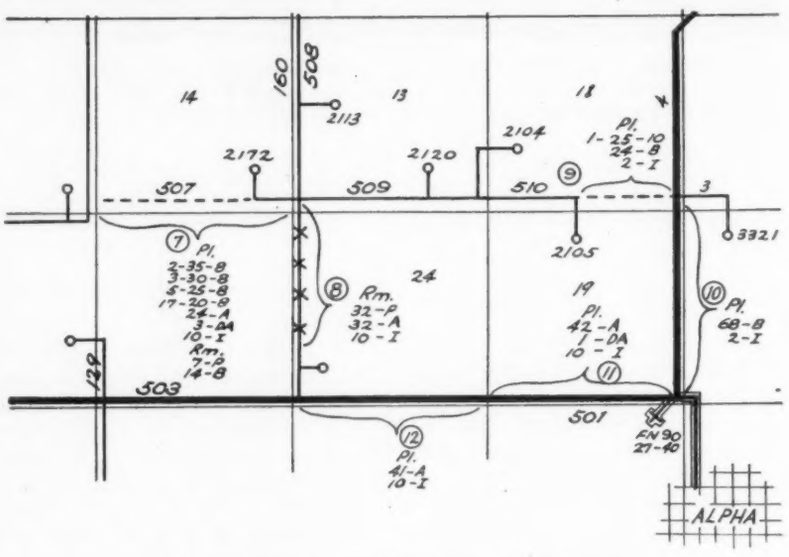


Fig. 2—Section of a working sketch map.

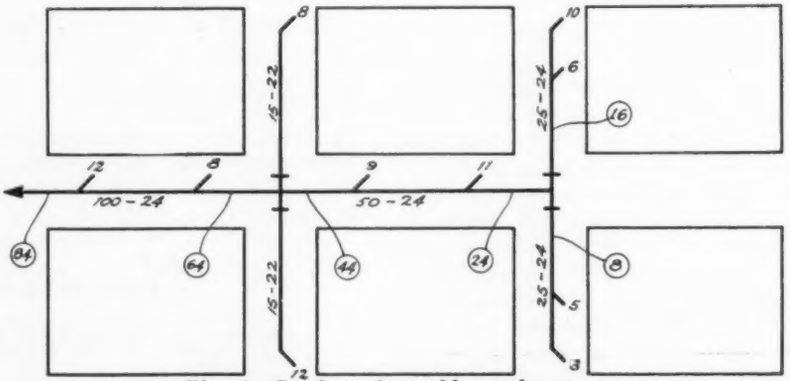
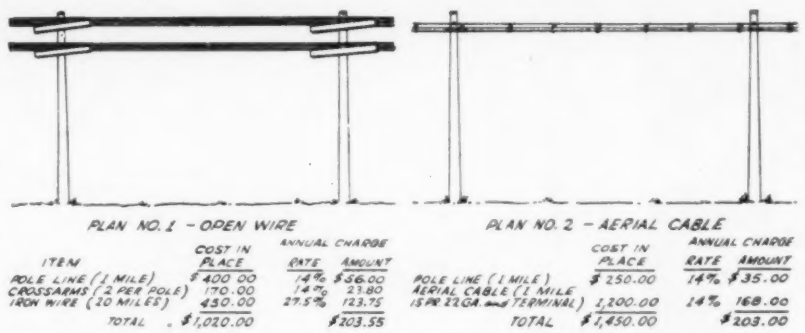


Fig. 3—Section of a cable study map.



ITEM	COST IN PLACE	ANNUAL CHARGE RATE	ANNUAL CHARGE AMOUNT
POLE LINE (1 MILE)	$400.00	14%	$56.00
CROSSARMS (2 PER POLE)	170.00	14%	23.80
IRON WIRE (20 MILES)	450.00	27.5%	123.75
TOTAL	$1,020.00		$203.55

ITEM	COST IN PLACE	ANNUAL CHARGE RATE	ANNUAL CHARGE AMOUNT
POLE LINE (1 MILE)	$250.00	14%	$35.00
AERIAL CABLE (1 MILE 15 PR 22 GA. and TERMINAL)	1,200.00	14%	168.00
TOTAL	$1,450.00		$203.00

Fig. 4—Cost comparison study of open wire vs. cable plant.

poles of adequate size are used to make certain that the line will not be "overbuilt". The class pole required for a given load can be computed by taking into account the force of major storms, and the amount of wire and cable plant carried by the pole. A pole with a *resistance moment* sufficient to produce the desired factor of safety can

Fig. 6—The chain saw will reduce tree removal costs.

then be chosen. Pole line design tables have been covered in *TELEPHONE ENGINEER AND MANAGEMENT* in recent years and will not be reviewed here. Readers interested in complete tables are referred to page 42 of the April, 1947 issue of *TELEPHONE ENGINEER AND MANAGEMENT*. *Table No.* 1 represents typical practice for rural line construction of one large midwestern telephone company. Poles are more readily available now than they have been in the past and it is a good time to strengthen the pole plant before we hit another pole shortage. Standard setting depths should be employed. *Table No.* 2 differs from setting depth data normally shown as it takes into account the load carried by a pole as well as its length. This table is for the heavy loading area.

The Wire Plant Design

IF OPEN wire is to be built, consideration should be given to the use of high strength steel wire in long span construction. For short and medium span rural construction, the 85-Grade steel wire is recommended; for long span construction, 135-Grade steel should be used. The comparative field of use of the several grades of iron and steel wire is shown in *Fig.* 7.

Exchanges contemplating conversion to dial operation and which wish to get maximum performance on rural lines can bring rural transmission up to city standards by use of the new "high efficiency telephones", and by placing Copperweld wire on lines which are more than 5 miles in length. The 104 mil size Copperweld wire is recommended. *Table No.* 3 gives complete data for 104 mil Copperweld wire.

The desirability of improving the cross talk and inductive interference balance of rural lines at time of major repairs should not be overlooked. Many rural lines in the past

(*Please turn to page* 63)

Table No. 1—Selection of Poles.

No. of Wires	Av. No. Poles Per Mile	Span Length (in Feet) Normal	Min.	Max.	Min. Pole size Length	Class	No. of Pole Fixtures Brackets	Crossarms 6-pin	Crossarms 10-pin
STANDARD CONSTRUCTION									
2	25	210	168	231	16	9	2		
4 to 6	25	210	168	231	16	9		1	
8 to 10	25	210	168	231	16	8			1
12	25	210	168	231	20	8	2		1
14 to 20	36	146	117	160	20	8			2
22	36	146	117	160	20	6	2		2
24 to 30	40	132	106	145	20	5			3
LONG SPAN CONSTRUCTION									
2	16	330	264	363	20	9	2		

Table No. 2—Digging Depths for Poles.

Total No. of Wires to be Carried	Length of Pole (in Feet)	Depth of Holes
2 to 10	16	3' 6"
6 to 6	20	3' 6"
8 to 10	20	4' 0"
12	20	4' 0"
14 to 22	20	4' 0"
24 to 30	20	4' 6"
2 to 6	25	4' 0"
8 to 10	25	4' 6"
12	25	4' 6"
14 to 22	25	5' 0"
24 to 30	25	5' 6"
2 to 30	30	6' 0"
2 to 30	35	6' 0"
2 to 30	40	6' 0"
2 to 30	45	6' 6"
2 to 30	50	7' 0"

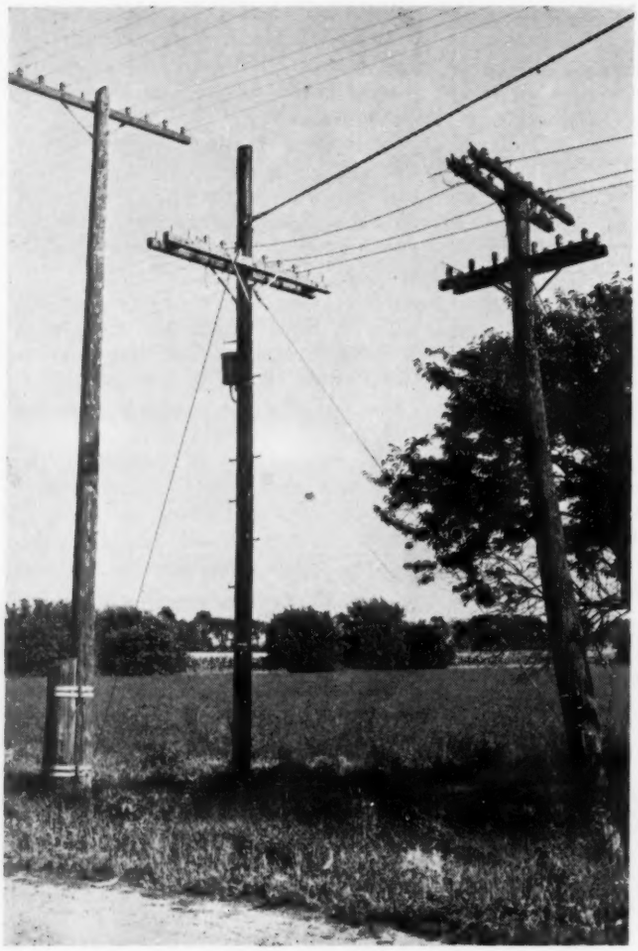


Fig. 1—New aerial cable and old plant displaced by it. In modern aerial cable construction the limits of span lengths are much greater than was permitted in older types.

Fig. 2—Dead end pole showing termination of strand. Dead end poles should be so placed that there is plenty of room left for the anchors.

Modern Aerial C

A POLE LINE SHOULD be as straight as possible in order to present a neat appearance. But more important is the fact that if it is not straight unguyed stresses and strains will eventually permit the messenger to slack off and drop beyond the original sag at construction.

Poles should be substantial in size. Most companies do not use poles smaller than Class 7 for any type of cable construction. Twenty-five feet should be considered a minimum pole length for both urban and rural lines. In built-up areas a shorter pole would not permit proper clearances over streets and driveways. The length of rural spans necessitates the same minimum, in order to provide proper sag for the messenger and yet maintain sufficient vertical clearance of span centers.

Terminal poles in urban construction will as a rule have to be at least 30 feet in length. Drop wires extending in one or more directions from these poles almost invariably cross streets or alleys, and legal clearances would not result from terminal attachments on a shorter pole. There are, of course, exceptions to this requirement. A terminal pole might be shorter if it is located on a high bank, or if none of the drop wires extending from it involves a road clearance.

IN MODERN AERIAL cable construction the limits of span lengths are much greater than was permitted in

Fig. 3—Termination of strand and down guy. For ordinary purposes guys used for cable dead ends should be one size larger than the strand which supports the aerial cable.

l Cable Construction

By G. A. KLEIN
VICE PRES. & GENERAL MGR.
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Columbus, Neb.
(A Gary Group Operating Company)

This series of three articles dealing with methods of aerial cable construction gives especial emphasis to attaching the cable to the suspension strand by the spinning process. Part I below treats of building the pole line for aerial cable.

older types. By the use of poles of proper size, and by the placement of the strand at recommended tension, it has been proved that the life of a cable with span lengths of 200 to 250 feet (or more) will be just as long as it is with spans of 100 to 150 feet. For rural areas long spans are now almost universally used. In urban construction, however, there is a limitation on span lengths imposed by the consideration that poles often are required to carry drop wire runs from one pole to another, in addition to strand and cable. Since the span lengths for these drop wire runs cannot be much over 150 feet without causing an unsightly and unserviceable sag, it will be wise to limit spans to this length where there is a possibility that drop wire runs will be needed. In emergency cases, however, it will be found quite practicable to suspend

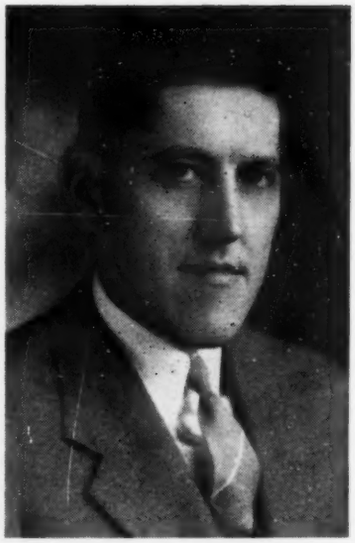
longer spans of drop wire to the messenger in the center of the span with a messenger support.

Another consideration that will govern span lengths in urban construction is location of the poles so that they will be as unobjectionable to property owners as possible—so that they will not interfere with the use of private drives, garage entrances and other facilities. It is desirable to locate poles on property lines when possible. By locating the poles in this manner it will often be found that spans of less than the desired length will be necessary. The spans need not be of uniform length, after all, although it is sometimes possible on long sections of unobstructed right of way to acquire some degree of uniformity. Of course, when such is the case the situation should be used to advantage.

Getting back to the consideration of pole locations for aerial cable construction, there are some additional factors which it is well to keep in mind. Dead end poles should be so placed that there is plenty of room for the anchors (Fig. 2). This is an extremely important requirement—so important in fact that it is sometimes desirable and necessary to change completely the proposed routing of an entire run of cable just because it is not possible to secure the proper anchorage for one dead end. Care should be taken in the location of all poles, and especially terminal poles, so that drop wires breaking from them have as clear a route as possible. Often shifting the proposed location of a pole just a few feet will permit the placement of clean and unobstructed drop wire runs, while the original location of the pole would have necessitated drop wire runs through heavy trees or through or around other obstructions.

Sometimes it will be found that it is not possible to place one of the poles exactly in line with the others. When this is true cable feet may often be used to advantage. These extension arms are heavy metal fixtures, obtainable from any supplier, that are fastened to the pole by means of through-bolts. They extend from the side of the pole so that the messenger may be attached to them at a point in line with the remainder of the poles. Many times this arrangement will be found advantageous in another way, since it permits placing a pole in an unexposed location while it would otherwise be necessary to place it in a location of relative insecurity.

In many cases it will be found



Author of this informative series, G. A. KLEIN, vice president and general manager, Nebraska Continental Telephone Company, Columbus, Nebraska.

desirable for the telephone company to place cable on poles used also by the power company. There are several advantages to an arrangement of this kind. First of all it eliminates duplicate pole lines. This elimination is desirable not only from the standpoint of economy but also as a public relations measure, there being a constant demand by the public for reducing the number of utility poles as much as possible. Another advantage of joint use is that stockier and more substantial poles, which hold their place in line better may be used. Jointly occupied poles in many cases permit the relatively easy elimination of conflicts between service and drop wires.

THE ANCHORS FOR pole lines which are to support aerial cable should be of substantial size. Most companies use one or more kinds of patent anchors. Their manufacturers will furnish data on the holding power of each size and type in various kinds of soil. Anchors that are to be used to dead end aerial cables should be chosen for a holding power at least equal to the strength of the down guy. In other words, if a 10,000 lb. strand is used for a down guy, the anchor selected should have a holding power of at least 10,000 lbs. in the particular type of soil involved. The anchor should, of course, be well tamped and the rod should be slanted to line with the point of attachment of the guy wire on the pole.

Above all, the anchor should be located well away from the pole. If possible it should be so located that the "lead" (distance from pole to anchor) is equal to the "height" (distance from ground line to point of attachment of the guy on the pole). When this condition can be obtained we have what is known as a one to one lead-height ratio. Anything less than this ratio will materially increase the strain on the anchor and guy. To offset this additional strain larger anchors and heavier guys and poles will be needed (Fig. 3).

For ordinary purposes guys used for cable dead ends should be one size larger than the strand which supports the aerial cable. If a 6,000 lb. strand is used to support the cable, the down guy at the dead end should be of 10,000 lbs. strength. If 10,000 lb. strand is used to support the cable, the down guy should be 16,000 lb. If 16,000 lb. strand is used to support the cable, two 10,000 lb. strands should be used as down guys. In all cases, as mentioned above, the anchors should have a holding power at least equal to the strength of the down guys. Steel strands in the utility grade, which is the one largely used by telephone companies, come in the following sizes and strengths: strand with a diameter of 5/16″ has a strength of 600 lbs.; with a diameter of ⅜″, 10,000 lbs; and with a diameter of 7/16″, 16,000 lbs.

It is now an approved and almost universal practice to fasten the down guy to the pole by means of an angle eye bolt extending directly through the center of the pole. Most companies have abandoned the older method of wrapping the guy wire around the pole several times and supporting it with guy hooks (more familiarly known as "jay" hooks). The eye bolt method of attachment is cleaner, stronger, and more economical. If the supporting strand is to be of 6000 lbs strength, a ⅝″ eye bolt is used. For larger strands a ¾″ eye bolt will be required. As an additional means of support for the eye bolt, eliminating the possibility of its cutting too severely into the pole, a strain plate is used for the down guys which carry a load as heavy as that imposed by an aerial cable run. This is a small metal plate with an 11/16″ hole in one end, through which the angle eye bolt is inserted. The other end of the plate has two smaller holes by which it is securely fastened to the pole with two ½″ lag screws. The down guy is fastened to the angle end of the bolt and an eye nut is affixed to the other end. This nut may be used to make the attachment of the supporting strand.

(*Please turn to page* 97)

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Telephone service is moving to rural communities at record pace. Here Jimmie Vanzant explains new telephone to Barbara Thaxton following cut over of new exchange at Sugartree Ridge, Ohio.

Hower Marlatt, left, John Grierson and Harvey Daniels try out first telephone system town of Sugartree Ridge, Ohio has had since 1938. Illustration is typical of many rural installations that will bring service to isolated areas.

Mrs. Lizzy Shelton, 88, "tries out" new Sugartree Ridge, O., telephone service —finds telephone greatly improved since town lost its service in 1938.

A New Look For Rural Lines

Here's how America's telephone industry tackles the ever increasing demand for telephone service in rural communities . . .By using recently developed methods, industry is bringing service to widely scattered farms and rural communities

By JOHN S. REED

THE EVER INCREASING demand for telephone service in rural communities has focused the attention of telephone organizations on the problem of providing satisfactory service to widely scattered farms and ranches. In the past, standard methods of extending telephone lines to furnish service in the more densely populated rural areas have been fairly profitable from a revenue standpoint. When, however, it is necessary to furnish service to subscribers at remote points, the revenue becomes insufficient to take care of the construction, operation, and maintenance of telephone plant in these areas.

Developments within recent years have brought about improvements in methods of furnishing telephone service. These improvements are partially due to the use of better and stronger materials and better construction methods, and partially to new methods of transmitting telephone signals and speech.

It is proposed to discuss recently developed methods for bringing telephone service to rural subscribers, namely, long span construction, joint use of rural open wirelines and power lines, telephone carrier on power lines, and rural radio telephone links.

Long Spans Aid Better Rural Line Construction

THE USE OF long spans in telephone open-wire lines without expensive increases in wire size and elaborate reinforcing methods has been made possible by the utilization of high strength line wire, such as HTL-85 and HTL-135 high strength steel and high strength copperweld wire. Furthermore, the development of the high strength wire

Residents of rural community of Sugartree Ridge, Ohio, give town's new telephone system a thorough inspection. In photo above, Barney Kruman tells villagers how the system works.

Fig. 1—Typical two-wire bracket lead with long spans of high strength wire. Advantages of having long spans include—fewer poles required and less labor needed.

Fig. 2 — Angle corner in bracket lead using spans of high strength wire.

has opened the way to the joint use of telephone and power lines in rural areas as explained elsewhere in this article.

When used in exclusively telephone rural line construction, the advantages of having long spans is immediately apparent. Fewer poles are required and less labor is needed to construct the open-wire lead. The high strength wires require much less maintenance than ordinary iron wire. *Figure* 1 shows a typical two-wire bracket lead with long spans of high strength wire.

The writer is familiar with trial installations made a number of years ago by his company that have proved the value of high strength steel line wire. Two open-wire bracket leads, each carrying two wires, were installed about ten years ago. One lead consisted of 2½ miles of HTL-135 steel wire on poles placed twelve to the mile, and the other consisted of 1½ miles of HTL-85 steel wire on poles spaced sixteen per mile. These pole spacings resulted in average span lengths of 440 feet for the HTL-135 wire and 330 feet for the HTL-85 wire. The wire sags were thus greater than sags encountered in standard wire stringing operations with ordinary iron wire, and it was therefore necessary to utilize poles 20 and 25 feet in length, instead of those 16 feet long used in standard construction, to obtain adequate clearances of the spans from the ground.

The terrain in the locality selected for the trial installation is quite hilly and there are heavy tree growths in the valleys. It was found that the long spans enabled poles to be installed on elevations in the land, so that the wires stretched across the valleys with sufficient clearances from the plant growths. The result is that tree trimming operations have been reduced to a considerable extent in this area.

In all that time, there has been no appreciable change in the wire sag, in spite of frequent heavy ice loads. The spans of high strength wire have a more even appearance than other spans of ordinary iron wire in the vicinity. It has not been necessary to pull slack, even in cases where tree limbs fell on the lines.

Sleet storms occur rather frequently in this area and, many times.

New brick and stone building houses new Ohio Bell Exchange at Sugartree Ridge, Ohio. Installation, illustrated by photos on these pages, illustrate telephone industry's program to bring service to isolated areas.

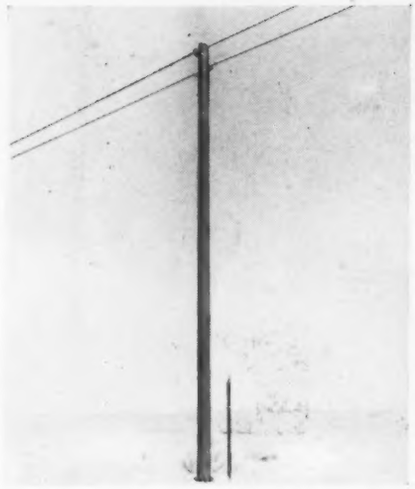

Fig. 3—Showing use of insulator pins in pole in experimental long span two-wire lead.

the lines were loaded with ice, result-in numerous breaks in spans of iron wire, while there have been only two breaks in the spans of high strength wire within six years, one of them due to the wire being kinked at the time of its instllation.

Manuals furnished by the manufacturers of high strength wire describe the proper methods to employ in installing long spans. The procedure, in general, is as follows for open-wire lines in the heavy loading district:

Poles, 20 and 25 feet long, Class 9, are placed twelve to the mile for two HTL-135 wires and sixteen to the mile for two HTL-85 wires, both of No. 12 BWG size. The poles are set to the standard depth. All corner, junction, and dead-end poles are well guyed with 4-inch screw anchors and 2,200-pound strand.

The high strength steel wire is strung on the poles in the same way as standard iron wire. In straight sections of the line, standard insulators (exchange or old toll insulators) on standard wooden brackets reinforced with one bracket clip are attached to the poles. Armor ties or tie splints are used to protect the wire from chafing on the insulators and to minimize wire vibration that tends to become excessive in very long spans. At small angle corners, two bracket clips are utilized to reinforce the wooden brackets.

At large angle corner and dead-end poles, the wires are attached to fin type wet process insulators fastened to the pole by a clevis assembly on an eyebolt. Galvanized copper dead-end sleeves of the compression type are used in fastening the wires to the insulators. *Figure* 2 illustrates a two-wire angle corner prepared in this manner.

At transposition points, transposition drop brackets with insulator on wood cob are employed to reduce crosstalk and noise induction.

Figures 3 *and* 4 indicate a departure from the usual bracket construction in a trial installation observed in eastern Colorado. Transpositions are made at every other pole, using two No. 56 insulators in a point transposition arrangement on a two-pin crossarm placed in line with the lead. On the alternate poles, holes are bored through the pole at an angle and standard insulator pins driven into the holes and insulators screwed onto the pins.

Use of Rural Open-Wire Lines

THE CARRYING of telephone lines on the same poles with power circuits is not a new idea. Telephone open wire and cable have been ointly carried with power wires in cities for many years with comparatively little trouble. The power line voltages seldom exceeds 2200 volts, well within the rating of telephone protective equipment. The pole spacing is rarely over 150 feet, which is within the limit for telephone open wire and cable.

The situation in the case of rural open-wire lines is quite different, however. Power lines in rural districts operate at higher voltages and the wire spans are very long, generally 350 to 450 feet. The high voltage creates the problem of shock hazard to telephone subscribers and employees and of noise induction which is apt to be very serious on account of the close spacing of the telephone and power wires and the long parallel of the telephone circuits close to the power line. These factors have precluded the carrying of rural lines jointly with power lines.

Within recent years, the development of high strength steel line wire has turned the attention of telephone groups to the possibilty of joint rural telephone and power lines. As the result of experiments by the Bell System, it is now feasible to carry telephone lines jointly with 7200-volt, single-phase, multigrounded neutral lines; provided that certain precautions are taken. These precautions include adequate protection of the telephone circuits from damage by the use of heavy duty protectors, frequent transposition of the telephone line wires, and the use of drainage units to reduce noise induction to a minimum. *Figure* 5 illustrates the typical arrangement employed under the conditions just outlined.

The heavy duty protector is an arrestor with three permanently mounted cylindrical carbon blocks

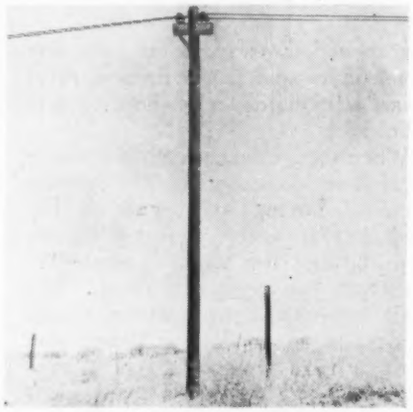

Fig. 4—Transposition point in experimental long span two-wire lead.

spaced equidistantly from each other to produce a 3000-volt air gap between each. One block is connected to ground while each of the remaining two blocks is connected to a line wire. One such protector is installed at one-half mile intervals and the ground connection is made to the same ground lead that is used for

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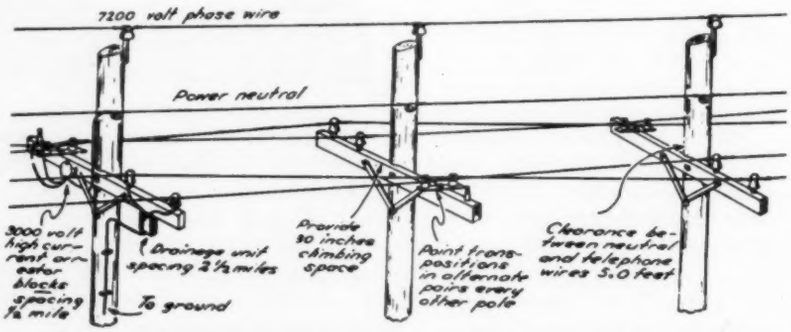
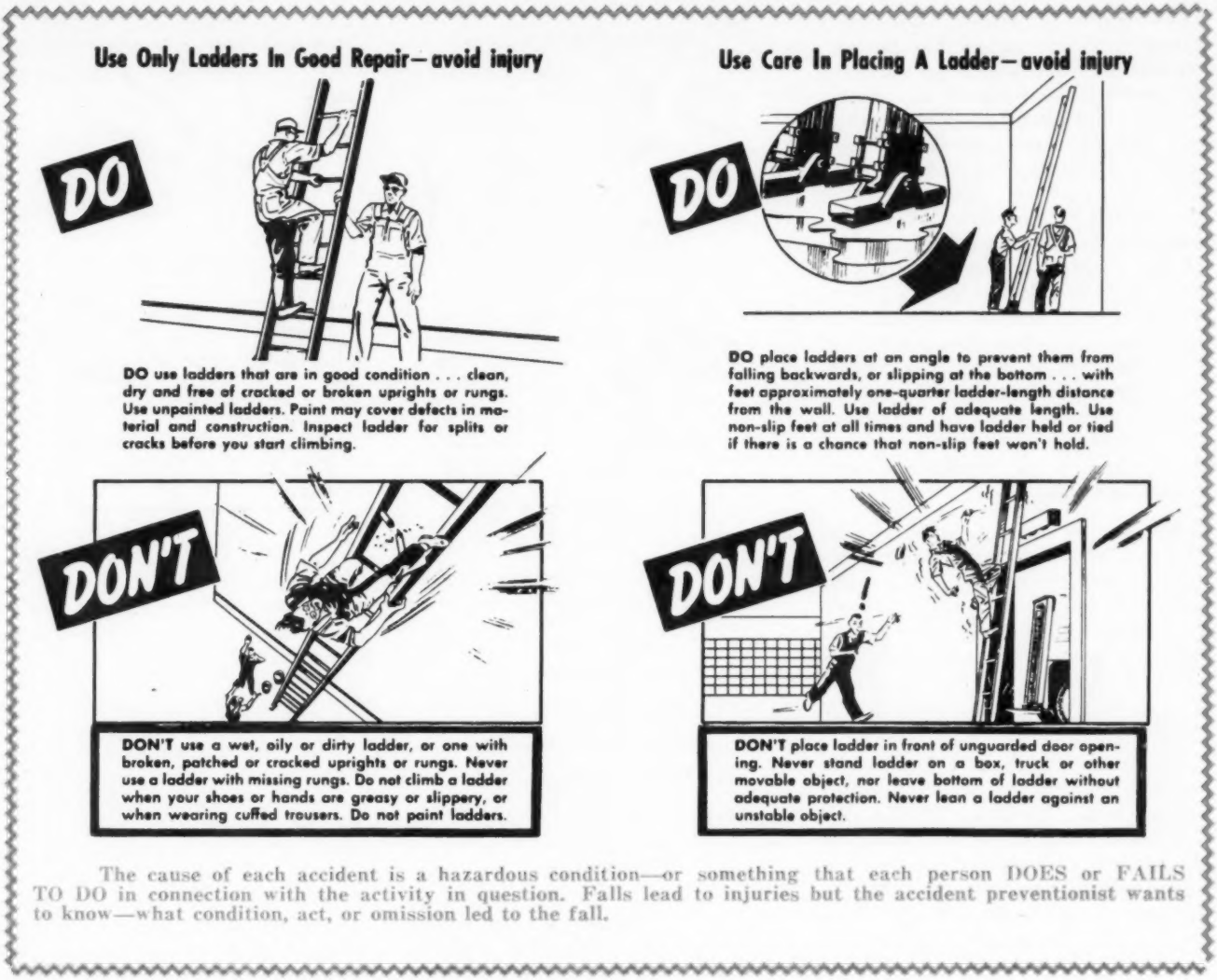

7200 volt phase wire
Power neutral
3000 volt high current arrestor blocks spacing ½ mile
Drainage unit spacing 2½ miles
To ground
Provide 90 inches climbing space
Point transpositions in alternate pairs every other pole
Clearance between neutral and telephone wires 5.0 feet

Fig. 5—Showing arrangement of protective equipment, drainage unit, and transposition insulators in rural lines carried jointly with a high-voltage line.


Use Only Ladders In Good Repair—avoid injury
DO
DO use ladders that are in good condition . . . clean, dry and free of cracked or broken uprights or rungs. Use unpainted ladders. Paint may cover defects in material and construction. Inspect ladder for splits or cracks before you start climbing.
DON'T
DON'T use a wet, oily or dirty ladder, or one with broken, patched or cracked uprights or rungs. Never use a ladder with missing rungs. Do not climb a ladder when your shoes or hands are greasy or slippery, or when wearing cuffed trousers. Do not paint ladders.
Use Care In Placing A Ladder—avoid injury
DO
DO place ladders at an angle to prevent them from falling backwards, or slipping at the bottom . . . with feet approximately one-quarter ladder-length distance from the wall. Use ladder of adequate length. Use non-slip feet at all times and have ladder held or tied if there is a chance that non-slip feet won't hold.
DON'T
DON'T place ladder in front of unguarded door opening. Never stand ladder on a box, truck or other movable object, nor leave bottom of ladder without adequate protection. Never lean a ladder against an unstable object.

The cause of each accident is a hazardous condition—or something that each person DOES or FAILS TO DO in connection with the activity in question. Falls lead to injuries but the accident preventionist wants to know—what condition, act, or omission led to the fall.

Safety Atop The Pole And On The Ground

Today's best safety records are made by those who use every effort to discover and correct unsafe physical conditions.

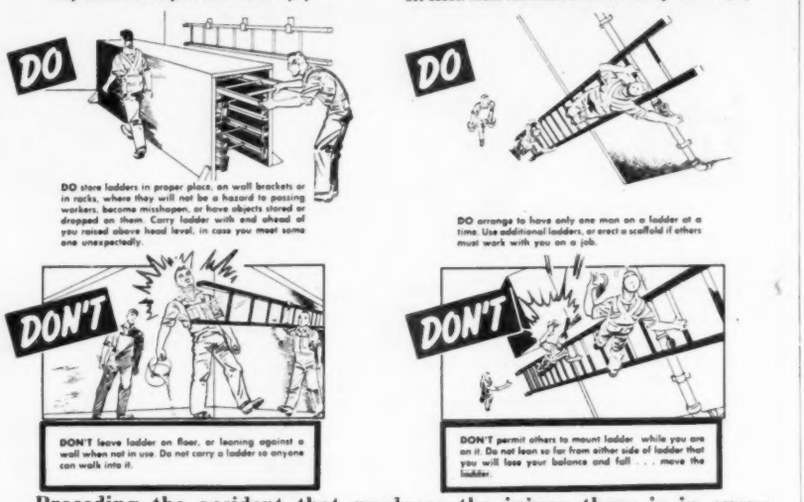
(Editors Note—This article starts a series dedicated to the presentation of suggested remedial measures that will aid in the reduction of physical hazards and faults of behavior that cause many of the accidents that occur in the telephone industry.)

By John G. Reynolds

THE TIME LOSS because of industrial accidents has been conservatively estimated at nearly 50 million man-days for 1948. This figure contains no allowance for the economic losses extending beyond the year and attributable to fatalities and permanent impairments. If allowances were made for these items, the probable total time-loss figure rises to approximately 270 million man-days. But even this figure, which represents nearly a year's work for 910,000 workers, does not take into account the millions of days lost because of time taken out for first-aid treatments and the decreased efficiency on the job after the injured's return to work. Nor does it include the time required by supervisors to investigate the accident, to provide care for the injured, and, frequently, to break in new men to replace those injured or killed. Further, the figure does not reflect the time necessary to replace or repair equipment or materials which frequently are damaged in industrial accidents. Large as the estimates are, they tell but a fraction of the total story.

Most of the accidents forecast for

1948 can be prevented. Competent safety engineers agree that at least 50 percent of all industrial accidents are preventable *practically* and *cheaply*, provided attention is directed to two factors—*unsafe working conditions* and *unsafe acts*. Since prevention of accidents is of utmost importance to the expansion minded telephone industry, we have dug out of our accident report file a few of the typical trouble makers that plague telephone men year in and year out. We hope that this presentation of common types of accidents will benefit individual plants greatly by insuring greater attention to safety by supervisors and employees, less waste, and lower workmen's compensation costs.


Keep Ladders In Proper Place — avoid injury
DO
DO store ladders in proper place, on wall brackets or in racks, where they will not be a hazard to passing workers, become misshapen, or have objects stored or dropped on them. Carry ladder with end ahead of you raised above head level, in case you meet some one unexpectedly.
DON'T
DON'T leave ladder on floor, or leaning against a wall when not in use. Do not carry a ladder so anyone can walk into it.
...se Ladder Alone And Avoid Excessive Leaning — avoid injury
DO
DO arrange to have only one man on a ladder at a time. Use additional ladders, or erect a scaffold if others must work with you on a job.
DON'T
DON'T permit others to mount ladder while you are on it. Do not lean so far from either side of ladder that you will lose your balance and fall . . . move the ladder.

Preceding the accident that produces the injury there is in every case either the unsafe act of a person or an unsafe physical or mechanical condition.

IN THE PROCESS of accident prevention, accident reports and records are extremely useful tools. The determination of the proper preventive measures, in each instance can be made only after an accurate and adequate anaylsis of the conditions or practices which resulted in the accident.

There is much confusion in the use of the word "*cause*" as applied to accidents. To the preventionist the cause of an accident consists of the defects, or actions, or lack of action, that should be corrected to prevent a recurrence. Such terms as handling materials, falls, burns, etc., commonly listed as accident causes, *are not causes at all*. Handling materials is an activity out of which many accidents come, but the *cause* of each accident is a *hazardous condition* or *something that some person does or fails to do in connection with the activity in question*, or in most cases a combination of these. Falls, lead to injury, but the preventionist wants to know what condition, act, or omission led to the fall. Burns are injuries, not causes.

CAUSES OF ACCIDENTS in the telephone industry or any other industry may be subdivided into mechanical and material faults, unsafe acts of persons and the reasons for those faults or unsafe acts. Several factors are always involved when an accidental injury occurs. They occur in a given sequence to produce a final result. H. W. Heinrich in his book "*Industrial Accident Prevention*" has likened these factors to several dominoes standing on end so that when the first is tipped over it will cause the rest to fall successively. Injury is the final domino. Preceding the injury there is an occurrence, that is the fall of a person or an object, or contact with a machine, and so forth. Preceding the occurrence that produces the injury there is in every case either the unsafe act of a person (such as using a file without a handle, wearing loose clothing around machinery, and so forth) or an unsafe physical or mechanical condition (unguarded machinery, protruding nails, a tool in disrepair, and so forth) or both. Back of these things are the reasons for the unsafe act or hazardous condition. Se we have our train of dominoes on end and culminating in an injury. The basic idea in prevention *is to discover the causative factors—the key dominoes—and remove* them, thus breaking the sequence and preventing the injury.

The classification of basic causes given in *Table I* has received wide acceptance. It can serve as an excellent guide in anaylzing accidents and accidental injuries. However, valuable as this anaylsis has proven, it does not bring out the fact that first attention should always be given to eliminating or reducing the physical hazard or fault. In nearly every case of accidental injury, both a physical hazard and faulty behavior will be found.

Studies by a committee of the American Society of Safety Engineers showed that in some 80 percent of a thousand cases studied the physical hazard could either have been eliminated or reduced by practicable means. It is obvious that had this been done in each case the faulty performance would have been very much less likely to lead to injury. Therefore, the sane common sense course is to reduce physical hazards by every reasonably possible means and then make every effort to eliminate faults of behavior also. Undoubtedly, if we could find a worker *who would never make a wrong or incorrect move he could operate the most hazardous machinery unguarded without getting hurt*. Comforting as such a viewpoint may be to those who are unwilling to spend money generously in the interests of safety, it is not the way to eliminate preventable injuries. The best safety records are being made and maintained by those *who use every effort to discover and correct all unsafe physical conditions and in addition painstakingly and continuously train and stimulate every employee to work safely*.

Many studies have been made to determine the proportion of accidents chargeable to physical hazards as against those chargeable to unsafe acts (faulty behavior). The ratio usually quoted is 15 to 85 percent. Actually such ratios have little meaning or value in the work of prevention. First of all such studies by attempting in each case to fix only the principal cause of injury ignore the fact that *most injuries* result *from a combination of physical hazard* and *faulty behavior* and that it is usually possible to improve both. Furthermore, the reduction (elimination where possible) of the physical hazard will reduce the likelihood of injury from faulty behavior. Finally, such ratios, resulting from data covering an entire State or a large number of insured risks and including both extremes and every graduation between are of little practical value for use in the individual establishment. Anaylsis of plant accident records show that while certain fundamentals are of general applicability,

the "firing line" detail of prevention is largely governed by conditions in each plant or operation.

SLIPPING, TRIPPING, and falling constitute major sources of injury throughout industry. Falls are commonly classified as " on the same level" or "to a lower level." In industry as a whole, falls to the same level produce the greater number of injuries, but the greater certainty of serious or fatal injuries from falls to a lower level justifies particularly careful attention to conditions that yield them.

In theory the prevention of falls is simple. Nearly all falls result from conditions or practices whose hazard is obvious or readily discoverable. In practice, however, prevention is difficult because the detail involved is very great and it is necessary to improve the performance of practically everyone. Every workman is subject in some degree to the hazard of falling, so not only must the conditions surrounding every workman be considered, but his cooperation in walking and working safely must be secured.

The commoner hazardous floor conditions are listed below together with comments as to their correction. Many of the defects listed may seem to be so obvious that their mention might appear unnecessary. However, the fact remains that they yield a continuous stream of injuries, proving the need of more thorough and careful attention to them.

(1) *Holes and depressions* result from wear, breakage (of floor surface), tearing up of floor (maintenance or alterations), broken or misplaced pit covers, sagging supports, overloading.

An awareness of floor hazards and the importance of their elimination must be cultivated and maintained by both management and workers.

(2) *Unevenness* due to faulty patching, wear, sagging of supports, warping of floor boards or plates, expansion (frost, heat, moisture), poor fit of edges, covers, etc.

Systematic inspection and prompt repair, railing or fencing of repair or construction jobs, pit covers secured in place, posting of safe load limits, safety-minded supervision, good construction, careful workmanship are the chief corrections for conditions described in the above paragraph.

(3) *Tripping* caused by piping, conduit, etc., run above floor level, valve stems, projecting parts of equipment, upraised edges of plates or planks, gratings (projecting edges, too wide openings), loose objects.

TABLE I—BASIC ACCIDENT CAUSES

Personal Faults

Faulty instruction:
1. None.
2. Incompleted.
3. Not enforced.
4. Erroneous.

Inability of employee:
1. Inexperience.
2. Unskilled.
3. Ignorant.
4. Poor judgment.

Poor discipline:
1. Disobedience of rules.
2. Interference by others.
3. Fooling.

Lack of concentration:
1. Attention distracted.
2. Inattention.

Unsafe practice:
1. Chance taking.
2. Short cuts.
3. Haste.

Mentally unfit:
1. Sluggish or fatigued.
2. Violent temper.
3. Excitability.

Physically unfit:
1. Defective.
2. Fatigued.
3. Weak.

Mechanical and Material Faults

Physical hazards:
1. Include mechanical, electrical, steam, chemical conditions, etc.:
   a. Ineffectively guarded.
   b. Unguarded.
   c. Unsafe design.

Poor housekeeping:
1. Improperly piled or stored material.
2. Congestion.

Defective equipment:
1. Miscellaneous materials and equipment.
2. Tools.
3. Machines.

Unsafe building conditions:
1. Fire protection.
2. Exits.
3. Floors.
4. Openings.
5. Miscellaneous.

Improper working conditions:
1. Ventilation.
2. Sanitation.
3. Light.

Improper planning:
1. Layout of operation.
2. Layout of machinery.
3. Unsafe processes.

Improper dress or apparel:
1. No goggles, gloves, masks, etc.
2. Unsuitable, long sleeves, high heels, defective, etc.

Injuries cost more than running pipes under even concrete floors. An order from the chief plant executive should be necessary to obstruct a passageway. If space about a point-of-operation machine is obstructed, the machine should be taken out of service until the space is cleared.

(4) *Slipperiness* due to grease, water, soap, drippage, or dirt collection, loading of pores of floor surface (wood or floor coverings) with chemicals, small, loose particles as sawdust, metal trimmings, match sticks, etc., wear (characteristic of metal plate unless specifically made to have and retain antislip properties), coating to preserve and aid appearance (waxes, varnishes), ice (outside platforms).

Excellent housekeeping is the chief corrective measure for conditions described: pans, drains, and splash guards to prevent spillage and drippage; exhausts to remove dust and small waste at point of origin; use of abrasive treads and floor plates; application of sand or abrasive powder to a coat of fresh paint or the equivalent; roughening metal tile or concrete with tool or acid; insertion of abrasive cross strips in floor coverings (appearance should never be placed ahead of safety).

(5) *Undesirable plan details*, such as slope (ramps, runways, for drainage), pits (for machinery, valves, etc.), drainage trenches, differences in level (low platforms).

Safety-mindedness in planning, designing, and constructing should be an absolute rule.

(6) *Vibration* due to inadequate supports, poor machine balance, too springy supports, machine supports tied rigidly to floor structure, poor maintenance or improper mounting of machinery.

Excessive vibration is so expensive in terms of interference with accuracy, loss of production, increased wear on machines, increased hazard, that competent management does not tolerate it.

(7) *Defective lighting* (not properly a floor condition but so important a factor in causing accidental injuries that it should never be overlooked) due to inadequate illumination, shadows, glare, moving, flashing or flickering light (as from furnace doors, welding, pouring metal, swinging lights), obstruction of light (smoke, dust, steam).

The power companies maintain technicians to study specific conditions and advise as to correction. Careful studies by competent safety-minded production engineers show clearly that good lighting is so im-

(*Please turn to page* 70)

Texans Map Pace-Making Plans for Lone-Star Independents

Statement of Sam Shutt, Texas Association President, that "Larger companies must help small exchange operator meet today's problems," keynotes general theme of Lone Star State's recent annual convention.

By RAY W. SMITH

THE ENTIRE slate of 1947 officers was re-elected by the Texas Telephone Association during its 43rd annual meeting, March 15-17 at the Buccaneer Hotel, Galveston.

Officers are: Sam H. Shutt, Sherman, president; R. B. Fairly, Lubbock, first vice president; D. T. Strickland, Brownwood, second vice president; Jean Shotwell, Lufkin, treasurer, and Jack Haley, Austin, secretary.

New members of the board are Charles Hendrix of Brazoria and Kirby Wilson of Corsicana. Re-elected directors are: Oscar Burton, Tyler; C. T. Chambers, Tenaha; D. H. Comparette Jr., Kerrville; George M. Johnson, Santa Anna, and L. Rust, Del Rio.

To this former resident of the Lone Star State the three-day meeting rated as one of the best and much credit is due officers, directors, the convention committees, and executive secretary Jack Haley for a fine program that held the interest of the audience from start to finish.

The first general session opened Monday afternon with Second Vice President D. T. Strickland, general manager Southwestern States Telephone Company, Brownwood, introducing the speakers. Following the invocation delivered by Rev. Will R. Johnson, First Presbyterian church, Galveston, the acting mayor of Galveston welcomed the convention group to the city.

PRESIDENT SHUTT in his report on activities of the president's office, stated that the industry is seriously threatened by proposed amendments to the Federal Fair Labor Standards Act which specify raising the minimum wage above 40c per hour and threaten elimination of the 500 station exemption.

"Increasing the minimum wage," he said, "in exchanges of over 500 stations is expected by many telephone people and it will work a distinct hardship in many cases where increases in rates will be necessary to meet increased costs and the local regulatory bodies are indifferent or unsympathetic to the telephone company's problems. This seems to be one of the anomalies of our form of government. One governing body can say what wages we pay but an entirely different governing body far removed from the first

Busy greeting friends at the Texas convention was this trio of well-known Independents: D. T. Strickland (left), Lloyd Spencer (center), vice president Stromberg-Carlson, Rochester, N. Y., and Jack Haley, Texas association secretary.

G. B. Dickson, (left) vice president I. T. & T. Co., New York City, Col. Will Parker, (center) North Electric Co., Galion, Ohio, and Oscar Burton, U. S. I. T. A. president, Tyler Texas, discuss Texas convention proceedings.

LEFT (left to right)—Roy Autry, Lubbock, Howard Housley, Dallas, "Doc" Fairly, Lubbock, F. M. Browne, president Missouri Association, Kansas City, and Chas. Cadwell, president Automatic Electric Company, Chicago. RIGHT (left to right)—Clyde Bailey, USITA executive vice president, Jack Haley and A. L. Robb, Electra.

one can say what rates we charge for our services."

Stating that the proposal to eliminate the 500 station exemption would destroy telephone service in a great many small towns in Texas and would render useless the investment in telephone plants in these towns, Mr. Shutt presented information showing that there are 647 Independent exchanges in Texas manually operated with less than 500 stations.

"The State Comptroller's Report," he said, "of gross receipt taxes paid by telephone companies during the quarter ending December 31, 1947, shows there were 90 companies that did not report sufficient gross receipts to pay an operator 60 cents per hour for a 30 day month, and 86 did not take in enough money to pay an operator 40 cents per hour. Of course, we in the telephone business know how these small exchanges are usually operated—switchboards located in residences where the housewife or other members of the family can answer calls as they come in."

Mr. Shutt stated that although the Unions and some Congressmen answer the industry's objections to changes in the Act by saying, "Raise the rates", such procedure is often impossible.

"I happen to know," he said, "of one exchange of 30 stations where the switchboard is located in a residence where the subscribers would have to pay an average of $9.60 per month each for telephone service just to get enough money to pay the operator 40 cents per hour for a 24 hour day. You know and I know they wouldn't pay it so that exchange would have to close and the people in that community be deprived of telephone service. . . . "

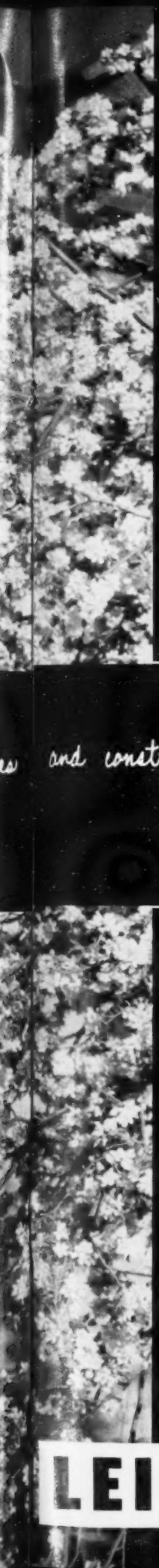
Discussing "timidity," Mr. Shutt stated that most telephone companies in Texas are timid about asking for adequate rates to cover the enormous increases in costs of furnishing telephone service.

"The fact that we have to deal with local regulatory bodies, City Councils and City Commissions," he said, "who know very little about the telephone business probably helps make us timid. But if we are going to maintain satisfactory service and expand our plants to take care of the increased demand for service, adequate rates are absolutely necessary to maintain financial stability. The people we serve have the right to expect reasonably satisfactory service and the people in the areas we serve who have applied for service which we have not yet been able to furnish, have the right to expect us to expand and extend our plants to serve them. We, on the other hand, have every right to expect our present or proposed subscribers to pay rates that are adequate to compensate us for the heavily increased costs of operations and extensions.

"Our first responsibility, as I see it, is to secure adequate rates where the present rates are not compensatory. The present rates for exchange service in a great many towns in Texas were set at a time when you could buy a square meal, including steak, for 35 cents; when you could buy the best pair of shoes in town for $3.50; when gasoline was selling for 8 cents a gallon. We all know that our labor costs have increased from 200 to 300 per cent and that is by far the biggest part of the cost of furnishing telephone service. Since most of the increased wages to telephone employees goes back into

Charles Hendrix, Brazoria (2nd from rear) and Mrs. Hendrix receive congratulations on his election to directorate of Texas Association.

" Hosh - it's time to ask Leich to send us some supplies and
materials for our Spring construction program - "



and construction

Your job in the spring is to get your outside plant in tip-top shape. Our job is to help you by furnishing the materials and tools and things you need. We count it our job, also, to see that you get the very best available — that you get it where and when you want it—and with the least fuss and bother and worry on your part.

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trade channels of the towns being served telephone users generally realize the fairness of the telephone company asking higher rates for their service. Since any changes in the rate structure of a telephone company must be approved by the local city Council or City Commission the problem is more difficult. But it is a problem that must be met honestly and fairly if we are to preserve the financial stability of the companies furnishing the telephone service."

In his closing remarks, Mr. Shutt made a strong plea for the small telephone companies in Texas that are badly in need of assistance in improving their service and securing adequate rates.

"Those of us that are part of larger groups," he said, "are not in need of such assistance as we have our own organizations for handling such matters. It is the small exchanges, usually individually owned, I am thinking of. This it seems to me is a part of the responsibility of the Texas Telephone Association, not a responsibility that can be met only by the Association officers as the job is too big. But one that can be met by those of us in the larger groups offering our assistance as to ways and means of improving service to the smaller exchanges near our areas.

"This of course must be done tactfully, as we can't and shouldn't try to tell the owner of a small exchange how to run his business; but the owner of the small exchange has so many problems he is usually very much interested in knowing how the larger telephone companies are meeting those same problems. We of the Texas Telephone Association have our responsibility to the telephone industry. We of course have our problems in taking care of our responsibilities to the people we serve and are helping the Industry by meeting these problems squarely and finding satisfactory solutions. But we would also be helpful to the Industry by helping the other fellow with a small exchange who may not have had the experience and opportunities to learn that some of us have had."

E. H. Danner, Sherman, and President Sam H. Shutt (right), check on progress of Texas convention program. In background, Oscar Burton, USITA president.

Col. S. A. Lindsey, Tyler, and R. A. Gantt, of I. T. & T. Co., New York City, pause for the TE&M camera.

"Major Problems Always Exist"

WILLIAM A. McCracken, works manager of the Kellogg Switchboard & Supply Company, Chicago, Illinois, in his discussion at the first convention session stated that although there has been a great deal said about industrial problems since V-J Day, problems are not any more numerous than "during the war, before the war, or during any other certain periods in the history of business."

"It is a fairly well established fact," he said, "that as one set of problems is solved another set seems to take its place. If this situation were to be thoroughly analyzed I believe you would find that all of these problems, or at least a number of them, will always exist in our business or in any other industry. What happens, however, is that the major problems or obstacles often overshadow the minor ones. These minor ones do not come to light or become real problems until the several major ones that we have been working on have been cleared away.

"It is important that a well-managed concern be organized so that it can surmount all the production and operating problems of the present day and still have sufficient foresight and power to evaluate the future and thereby plan properly for a smoother running operation year by year. It is just this sort of thing that we manufacturers today are attempting to do, so that we can be of more service to the Independent telephone operating company during the years to come."

Mr. McCracken described the following as immediate manufacturing problems.

(1) Skilled labor such as tool makers, die makers, screw machine operators, and punch press set-up men are still at a premium, but the situation is definitely easing as the post V-J Day tooling of new products and retooling of old ones is being completed.

(2) Companies are receiving much better grade of semi-skilled labor than during the war years.

(3) In the case of unskilled labor, manufacturers are still experiencing a problem because the demand for semi-skilled labor is such that a large group recently considered unskilled have been upgraded and have been moved into the semi-skilled group, resulting in a shortage in the unskilled ranks.

(4) Office and clerical help is still quite scarce in the Chicago area. This is partially caused by a housing and rooming shortage. It is estimated that nearly 70,000 young girls from out-

lying areas are normally employed in Chicago during the week and return to their homes over the week-end. Inasmuch as rooms are not now available for the four nights they are accustomed to staying in Chicago, it is impossible for some of them to accept work in the metropolitan area.

Mr. McCracken stated there has also been considerable said relative to the efficiency of employees after V-J Day.

"It was fairly well established," he said, "in the first year after the war that labor was possibly 20% to 25% less efficient than before and during the war. This situation is improving as there becomes increased competition for jobs and as the foremen and supervisors in the plants have more time to give individual attention to their employees. . . "

Mr. McCracken states that the manufacturers realize that the problem of efficiency and increased production is extremely important.

"We feel," he said, "that it is even possible for the individual liberty of our people to be jeopardized when production falls beyond a certain level.

"Employment is at its highest level and there are more people employed today than in pre-depression times. Because of this high employment level you can readily realize that all manufacturers have had a training program to accomplish, and this has burdened us with increased costs. . . .

"The Independent telephone operating company and its suppliers of equipment have always been rather resourceful, however, because they still make it possible to make a telephone call for a nickel. You will recall that some years ago it was possible to post a letter for local delivery at a cost of one penny. In those days a local telephone call could be made for a nickel. In later years, postage rates increased. There was a period when letter postage for out-of-town delivery was three cents and local delivery was two cents. There came a raise to three cents for local delivery, and a 30% raise in the special delivery cost. But the little old nickel is still good for a local phone call as it was in the days of one-penny postage. Likewise, long distance service has been vastly improved and rates reduced. Private enterprise has certainly favored the subscriber in the telephone field."

Speaking of actual material shortages Mr. McCracken said there are a few important ones at this time. It is still difficult to obtain wire in small gauges excepting with long delivery, and it is also hard to obtain steel, particularly in special sizes and alloys. Other than that, most material is available if ordered sufficiently in advance of requirements.

Texas registration desk was busy spot. Morris Burton (standing) and Mrs. Jeanette Hensley (right end of registration desk) have Texas convention records that are hard to beat.

"Our larger problem," he said, "in this respect, lies in that our customers still do not fully realize the lead times necessary in order to obtain raw materials, and while it is true we forecast our own requirements and plan to stock standard components, we have not yet reached a day where supply versus demand is at a point where we can do extensive stocking in order to give off-the-shelf delivery.

"The majority of our production is filled to capacity on certain items for months in advance. On other items, the output for well beyond a year has already been spoken for. It is therefore extremely important that the forecasts of Independent telephone operating companies be as accurate as possible and that you advise your manufacturer of your equipment needs so that he, in turn, can make more accurate his schedules to meet the demands that are placed upon him for equipment. . . .

"Ultra-close cooperation between the customer and the manufacturer in all of our dealings aids both parties considerably, inasmuch as we are actually of one organization, the United States Independent Telephone Industry, and can accomplish economies in both manufacturing and operating by this cooperation."

"Are We Missing The Boat on Radio?"

THE FINAL speaker at the Monday session, Fred E. Norris, vice president, General Telephone Services Corporation, New York City stated that "possibly the telephone industry might well afford to ask itself whether the types of mobile service now being offered meet all the important needs of its customers."

"Questioning whether the types of mobile service now being offered by telephone companies is in all cases adequate," he said, "must not be construed to mean that I am in any way critical of that service. On the contrary, it is my view that the types of mobile services now being offered should be continued, and not only that, but expanded and further developed in all respects. If there is a need for a new type service, it should be as a service to supplement that now being offered and not as its substitute."

Mr. Norris stated that the FCC December, 1947, mobile service hearing would have "lasted a month instead of a week if all interested were given as much time as they wanted to present their cases."

"The large number of interested parties, the large number of channels each was seeking, he said, "and the force of argument by the high-priced legal talent present, combined to lend much emphasis to the proposition that the limited number of usable radio channels available must, indeed, be very valuable. I might add at this point that the telephone industry was greatly outnumbered at that hearing and that some of those outside of our industry in their own interest used the strongest arguments they could to influence a decision prejudicial to our industry's interest. Needless to say, our industry's representatives met the challenge head-on and, in my opinion, acquited themselves admirably."

Testimony presented at the FCC hearing by persons outside of the telephone industry, assumed the following pattern:

(1.) The primary need for mobile radio-telephone service in certain in-industries is to control the movement of vehicles.

(2.) Two or more calls frequently are necessary to effect a single dispatch and because of customer's revenue considerations, the cost per call or message must be reasonably low.

(3.) The conversation or holding time for dispatching vehicles is very short—from 10 to 20 seconds.

(4.) Because of the short holding time, a large number of vehicles can be

(*Please turn to page* 58)

You save on Rural

with these MAGNETO MONOPHONES

and New Magnet-Battery Box

The beautiful Type 40 Desk Monophone (also shown in large illustration) will be welcome in the finest homes.

The unique Type 50 Wall Monophone combines the convenience of the handset and of the wall-mounting telephone.

You'll make a fine investment when you replace old-style magneto telephones with these modern Monophones. Once installed, these instruments will need very little attention for years to come. Because of their exceptionally high transmission efficiency, they'll provide much better service on those long and heavily loaded lines. And your investment will work for many years, for these fine instruments are ready to convert to Central-Battery operation by changing a single connection — and to automatic operation by simply adding a dial.

Automatic's new Magneto-Battery Box, companion-piece to these Magneto Monophones, contains a compact magneto generator equipped with powerful Alnico magnets and battery feed coil, plus space for two No. 6 dry cells or a two-cell unit battery. Code-ringing, semi-selective or selective ringing is provided by a special push-button control when specified. Use these new Magneto Monophones from this time on, and see how they cut your costs and better your service.

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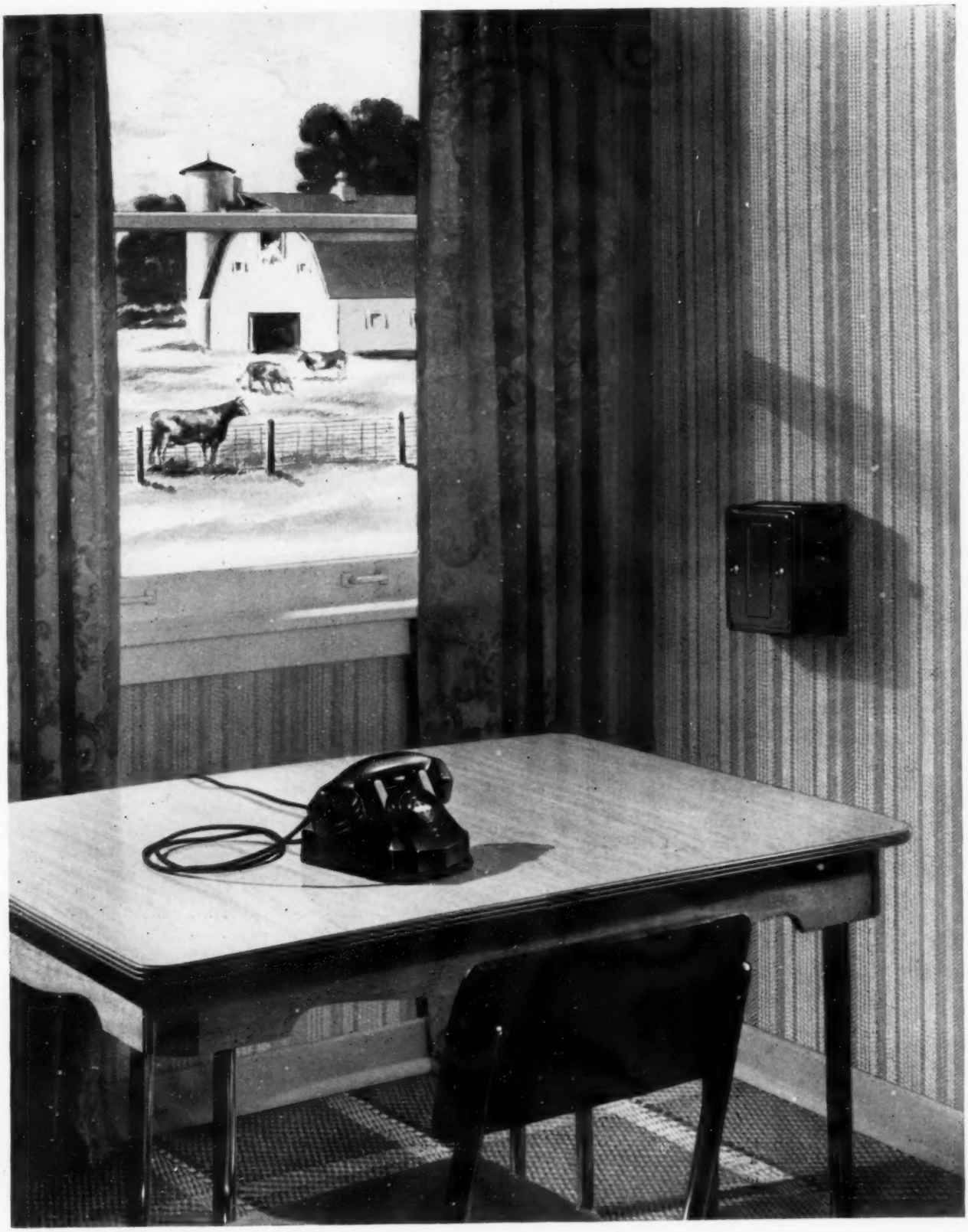


served from a single channel—as many as 100 to 125 vehicles.

(5.) Because of the short holding time, delays in reaching a mobile unit because of "busy channel" conditions are reduced as compared to those encountered over systems rendering 3-minute talking period mobile service.

"To reiterate," Mr. Norris said, "these ideas are not original with me, but instead, are the gist of testimony given by people outside our industry. As this pattern of service requirements appears to make sense, and as the demand for service according to this pattern may be appreciable, the question naturally arises as to whether a new service, specifically tailored to meet purely dispatching needs, should not be offered.

"It should be made clear at this point that additional frequency assignments to our industry also are required before any new dispatching service concept can be made operative. This matter of securing adequate radio frequencies for our industry is, indeed, important, and it is receiving the constant attention of U. S. I. T. A."

Mr. Norris stated that the question was raised to whether the telephone industry might not properly consider developing a type of service specifically tailored to meet dispatching service needs according to a particular pattern.

"That pattern," he said, "suggests that a purely dispatching type of service, with these objectives, may have good commercial possibilities:—(1.) Consider limiting the message content to directing the movement of or reporting the whereabouts of vehicles, (2.) limit the number of attempts to reach a vehicle in a given period of time; (3.) limit the conversation time —say, to 20 seconds; (4.) charges for the service to be on a flat-rate basis, that is, a message or use charge will not apply, although, to prevent possible abuse, there may be a ceiling beyond which a message or use charge would be made, and (5.) The customer may own the equipment in his vehicle or it may be furnished by the telephone company.

"Such merit as this concept has, he said, appears to lie in the fact that, as the holding time would be very short, more vehicles could be served per radio channel at a given grade of service, than could be served from one also rendering 3-minute talking-period service or one which contemplates a longer dispatching time. If more vehicles can be served from a given channel, revenue possibilities appear which may make a flat-rate type of rate treatment practicable. The assumption would be to limit the service in all respects to the minimum channel usage essential to accomplish the objective of the subscriber—namely, to regulate the movement of his vehicles.

"It was with this objective in mind that it was suggested that the message content be limited. By that is meant to require the customer to limit the conversation to that essential to the movement of the vehicle as contrasted to giving instructions, reports, or carrying on general conversation. This may be quite difficult to control and, for this reason, another means may have to be found to attain the objective. As an alternative, for an example, it may be practical to cut off the conversation automatically after so many seconds—say, 20—on the air. Further, it may be advisable to design a rate schedule for passage payments or, per minute of use payments, for messages or usage in excess of a base allowance. Possibly this could be accomplished on an automatic recording or metering basis.

"Keeping down operating costs, and, in turn, service charges, to the minimum appears to be a reasonable requirement of the dispatching service being discussed. With this in mind, it may be entirely feasible to dispense with the use of selectors in the mobile units. These are the devices which select and signal a particular mobile unit being called. There may be other ways of keeping costs to the minimum —for example, some of our industry's design engineers may devise a relatively simple means by which a customer may dial a mobile unit—and vice versa—thus eliminating the need of an operator making the connection.

"The point of these remarks is that a dispatching service of the kind described is a 'work-horse' type of service—so to speak—and as such, it can do without some of the features which may be desirable, but dispensible, for such a class of service, in the interest of keeping the cost as low as possible.

"A new service of this kind naturally will require careful study before it is established. This may suggest to you that I have been talking pure theory and yet I believe it is not entirely the case. In fact, I feel that my feet are on rather sound ground, for mobile radio service very much like the type described is now being rendered by companies—not telephone companies, however—who are in business for that specific purpose.

"These companies are referred to as specialized common carriers. These carriers are beginning to spring up in various parts of the country. They seem to make no bones about the fact that they are operating in competition with telephone companies. Such competition obviously is inimical to the

(*Please turn to page* 72)

TE&M camera caught this group of Texas conventioners between sessions. Left to Right—Mr. and Mrs. Dink Robb, Electra; Dory Neale, Topeka, Kan.; Fred Norris, New York City, and Mrs. Neale of Cable Spinning Equipment Co., Topeka, Kan.

H. C. Ryon and Col. Will Parker, North Electric Company, were chatting with T. A. Singer, Dimmitt, when the TE&M Camera snapped this shot.

A HANDBOOK for Telephone Men

INDEX—Pole Line Construction
DATE—April 15, 1948

SUBJECT—Materials Used in Rural Open-Wire Construction

THE CONSTRUCTION of *rural open-wire extenssions* and the *rebuilding of existing open-wire lines* calls for the use of certain items of pole line materials that should be kept on hand for this purpose. The items listed in *Table I* are suggested items of such materials.

ITEM	USE
Anchors:	
5″—2-way Expanding	For 2200-pound guy strand. (Requires one ½″ thimble-eye anchor rod.)
8″—2-way Expanding	For 6000-pound guy strand. (Requires one ⅝″ thimble-eye anchor rod.)
8″ x 25″ Plate Type	For 10000-pound guy strand. (Requires one ¾″ thimble-eye anchor rod.)
8″ x 35″ Plate Type	For 16000-pound guy strand. (Requires one 1″ thimble-eye anchor rod.)
4″ Screw Type	For 2200-pound guy strand.
10″ Swamp Type	For 6000-pound guy strand in swampy locations. (Uses 1½″ steel pipe and pipe-eye nut.)
12″ Swamp Type	For 10000-pound guy strand in swampy locations. (Uses 2″ steel pipe and pipe-eye nut.
15″ Swamp Type	For 16000-pound guy strand in swampy locations. (Uses 2″ steel pipe and pipe-eye nut.)
Bolts:	
⅜″ x 4″ Galvanized Carriage	To attach crossarm brace to crossarm.
½″ x 4½″ Galvanized Machine	To fasten diagonal brace to side arm.
⅝″ Crossarm (12″ to 22″ long)	To attach crossarm to pole.
⅝″ Double Arm (12″ to 22″ long)	At ends of double arm to space and reinforce the arms.
Bolts, Thimble-Eye:	
¾″ Straight (10″ to 16″ long)	For attaching 6000-pound or 10000-pound guy strand to pole when Lead/Height ratio is more than 1¼.
¾″ Angle (10″ to 16″ long)	For attaching 6000-pound or 10000-pound guy strand to pole when Lead/Height ratio is 1¼ or less.
1″ Straight (12″ to 18″ long)	For attaching 16000-pound guy strand to pole when Lead/Height ratio is more than 1¼.
1″ Angle (12″ to 18″ long)	For attaching 16000-pound guy strand to pole when Lead/Height ratio is 1¼ or less.
Braces:	
Back, 5′6″	To reinforce side arm when more than 6 wires are to be carried.
Crossarm, 30-inch	With standard and B type (10′0″) crossarms and in 8′6″ side-arm construction when regular diagonal brace is not to be used.
Crossarm, 24-inch	With pony (8′6″) crossarm and in pony 6-pin (5′2″) side-arm construction.

A HANDBOOK for Telephone Men

INDEX—Pole Line Construction
DATE—April 15, 1948

SUBJECT—Materials Used in Rural Open-Wire Construction

ITEM	USE
Braces (continued):	
Crossarm, 20-inch	With pony 6-pin (5′6″) crossarm.
Diagonal	In side-arm construction.
Brackets:	
Wood Pole	For supporting insulators in bracket leads.
Transposition Drop	For supporting insulator at transposition point on crossarm.
Clamps:	
1-Bolt Guy	With 2200-pound guy strand.
3-Bolt Guy	With 6000-pound and heavier guy strand.
Stub reinforcing	Stubbing poles.
Clips, Bracket, Top and Bottom	Reinforcing wood pole brackets.
Crossarms:	
10′0″ 10-pin Standard	3¼″ x 4¼″ 10-pin type for crossarm leads.
10′0″ 10-pin Type B	3¼″ x 4¼″ 10-pin type with 32″ pole pair pin spacing.
8′6″ 10-pin	2¾″ x 3¾″ 10-pin type (pony) for exclusively rural line construction.
5′2″ 6-pin	2¾″ x 3¾″ 6-pin type (pony) for exclusively rural line construction.
6′0″ 6-pin	3¼″ x 4¼″ 6-pin type for crossarm or side-arm construction.
Extension Fixture, Pole Top	To extend height of pole so that drop wire span from open wire to residence across road will have sufficient clearance from road.
Hook, Guy	To hold wrapped guy strand in place on pole.
Insulators, Strain:	
No. 502	With 2200- or 6000-pound guy strand in situations of exposure to voltages of 300 to 5000 volts.
No. 504	With 10000- or 16000-pound guy strand in situations of exposure to voltages of 300 to 5000 volts.
No. 516 (Multi-Fin Wet Process)	With all sizes of guy strand in situations of exposure to voltages from 5000 to 17000 volts.
Insulators, Glass:	
No. 9 or Pony Type	Single-groove insulators commonly used for carrying steel line wires.
No. 10 or Exchange Type	Double-groove insulator used interchangeably with the No. 9 insulator for carrying stel line wires.
No. 16 or New Toll Type	Single-groove insulator used in copper wire lines.

A HANDBOOK for Telephone Men

INDEX—Pole Line Construction
DATE—April 15, 1948

SUBJECT—Materials Used in Rural Open-Wire Construction

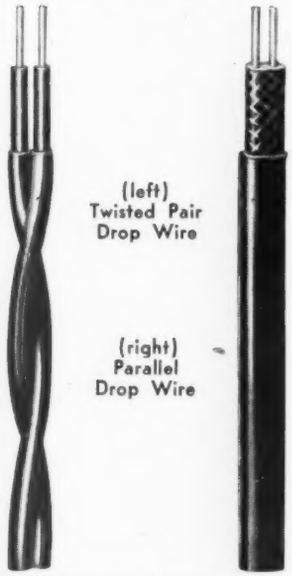
ITEM	USE
Nails Galvanized:	
6-d	Fastening insulator pins in crossarm, also strain plate to pole.
30-d.	Fastening wood pole bracket to pole.
50-d	Fastening wood pole bracket to pole.
Classification, Nos. 1 to 10	In pole to indicate class of pole.
Nuts:	
¾" Forged Thimble-Eye	In guying arrangements using 6000- and 10000-pound guy strand.
1" Forged Thimble-Eye	In guying arrangements using 16000-pound guy strand.
Pin, 8" Wood Insulator	To support insulators on crossarm.
Plate, Guy and Load	With thimble-eye bolts to properly support load and prevent splitting of pole.
Plate, Strain	On pole to prevent the choking effect of 6000-pound or heavier guy strand wrapped around the pole.
Rings:	
⅝" Bridle ⅝" Drive	For supporting runs of bridle wire on pole and crossarm.
Rods, Thimble-Eye Anchor	
½" x 5'0"	With 5" 2-way expanding anchor.
⅝" x 6'0" to 8'0"	With 8" 2-way expanding anchor.
¾" x 8'0" to 10'0"	With 8" x 25" plate anchor.
1" x 8'0" to 10'0	With 8" x 35" plate anchor.
Screws:	
¼" x 2" Fetter Drive	Fastening bracket clips and transposition drop brackets.
½" x 4½" Galvanized Drive	Fastening guy hook, guy and load plate, and crossarm braces to pole.
½" x 6½" Galvanized Drive	Fastening diagonal brace for extension arm when more than one such arm is used on a pole.
Sleeves, Compression:	
3-045B (Straight Copper)	Splicing No. 18 bridle wire and No. 17 drop wire.
3-064B (Straight Copper)	Splicing No. 14 drop wire.
1-102D (Straight Copper)	Splicing 104 (No. 12 NBS) copper line wire.
2-109D (Straight Galvanized Copper)	Splicing 109 (No. 12 BWG) steel line wire, also 104 copper line wire to 109 steel line wire.
91-102D (Offset Copper)	Dead ending 104 copper line wire on insulator.

ENDURANCE

in TELEPHONE WIRES

Neoprene Jacketed Drop Wires are a proven superior product and will greatly increase life of your installations . . .

NEOPRENE
means
ENDURANCE plus



(left) Twisted Pair Drop Wire

(right) Parallel Drop Wire

OUTSIDE WIRES

Drop, bridle and tree—sizes 14 to 22—B&S, bronze, copperweld, copper and iron conductors, rubber insulated, cotton braided.

INSIDE WIRES

Sizes 19 to 22—B&S with rubber insulation, cotton braided or plastic insulated.

NEOPRENE has:

* Greater abrasion resistance
* Best weathering characteristics in all climates
* Freedom from fraying and rot
* Flexibility at all temperatures
* Very high tensile strength
* Positive resistance to all chemicals

●

PLASTIC INSULATION is particularly adapted for inside jumper and duct wires, has bright colors for identification, smaller diameters, is flame and moisture proof, offers high resistance to abrasion and will not support fungus growth.

●

Samples of Neoprene drop and bridle wire are available—wire or write today.

Distributed by

KELLOGG SWITCHBOARD & SUPPLY COMPANY

CHICAGO 38, ILLINOIS

GENERAL INSULATED WIRE WORKS, Inc.

TELEPHONE HOPKINS 2100

69-105 Gordon Avenue ● Providence 5, Rhode Island

Highland Telephone Company Inaugurates Toll Dialing

Deputy Mayor John J. Bennett of New York City and acting Mayor Joseph J. Gnocchi of Monroe, N. Y., carried on an animated conversation at noon March 23 on the first call to inaugurate operator toll dialing from an Independent telephone company to the metropolis.

The call was a feature of a luncheon attended by civic and business leaders at Monroe and sponsored by the Highland Telephone Company in Orange County, to mark the opening of this service improvement. Another call followed immediately between Fred Florance, president of the Highland company and C. W. Phalen, vice president of the New York Telephone Company in New York.

In toll dialing a call to New York City, the Monroe operator takes the call from the subscriber, plugs into the toll circuit to New York and dials the New York number.

This new method of reaching metropolitan circuits direct, is handled in two steps by the Monroe operator alone as compared with six steps involving two operators. Previously, the Monroe operator would plug into a toll circuit and ring, wait for New York long distance operator to answer and then pass the call. The New York operator would then dial the number.

◆

Expansion Is Under Way In Mankato, Minn.

Improved and more extensive telephone service is in store for subscribers in Mankato and North Mankato, Minnesota as a result of an expansion program now being carried on by the Mankato Citizens Telephone Company.

Increased capacity through the automatic switchboard has already been provided, but it will be many months before the full effects of recent equipment additions are felt in the way of added telephones, P. M. Ferguson, Jr., assistant general manager and plant engineer, pointed out.

Recently installed by the company was the largest exchange cable ever "pulled in" in Mankato. The new cable pulled into an underground conduit as one of the main feeder cables leading into the exchange contains 1,515 lines. From this cable, other smaller cables branch off.

Trucking equipment ordered nearly seven years ago arrived recently and was installed in the exchange to make it possible for more calls to be handled during busy hours.

Spring Construction Program

(*Continued from page 39*)

THE OMEGA TELEPHONE & TELEGRAPH COMPANY

AUTHORIZATION, ESTIMATE No._____

TITLE

DATE 19 DISTRICT

FIXED CAPITAL ACCOUNTS:

GROSS ADDITIONS $	PLANT DISPLACED $		NET ADDITIONS $
RESERVES:			
REMOVING $	PLANT DISPLACED $	SALVAGE $	NET TO RESERVES $
WIRING GAIN & LOSS:	WIRING LOSS $	WIRING GAIN $	NET $
GROSS EXPENDITURE: $		SALVAGE & WIRING GAIN $	NET REQUIREMENT $

MAINTENANCE: (TO BE EXPENDED IN ADDITION TO THE ABOVE)

GROSS $ SALVAGE $ NET $

WORK TO BE STARTED ABOUT 19 AND COMPLETED ABOUT 19

NATURE AND NECESSITY OF WORK:

APPROVED	DATE	APPROVED	DATE
		EXECUTIVE COMMITTEE BY: SECRETARY	

Fig. 5—Authorization estimate form used by larger companies.

have either not been transposed at all or transpositions have been on a hit and miss basis. A standard transposition scheme such as the Bell System Type-N (See *Fig.* 8) is recommended.

A maximum degree of balance may be obtained by use of the new simplified "point type" transmission fixture shown in *Fig.* 9. These are of course a "must" on rural joint use construction. In addition to improving crosstalk and inductive interference balance by means of accurately spaced transpositions, consideration should also be given to improving the line resistance unbalance by replacing bad splices with compression sleeve type joints, and checking all jumper connections. The high inductive influence of multi-grounded rural power lines necessitates a much higher degree of maintenance than in the old days, if noise levels are to be kept low. Adequate clearance from trees should be obtained during construction work as tree leakage is one source of high noise levels.

Chemical Treatment Of Tree Stumps

RECENT INFORMATION indicates that tree growth under telephone leads can successfully be concontrolled by chemical methods. Amate and 2-4D (46% Ester form) have been used with good results, according to tests that have been conducted. It can be applied to the freshly cut stumps of large trees to prevent sprouting. If applied in a large dosage it will provide a permanent kill of the root structure. It can also be applied in small cups cut into the trunks of large standing trees at a point near the ground line to get a kill.

These chemicals will give excellent killing results when sprayed on small trees and bushes with a power sprayer to obtain a permanent kill (*Fig.* 10. However, this method is effective on tree or hedge growth of about four feet or less. The spraying method is particularly effective on elder, birch, box elder, wild cherry, cottonwood, elderberry, wild plum, and sumac. It has not proven effective on oak, ash, dogwood, osage orange, locust and some kinds of willows. Telephone companies interested in chemical methods of tree control should consult their state agricultural college with respect to the most effective method for the tree species involved in a particular area.

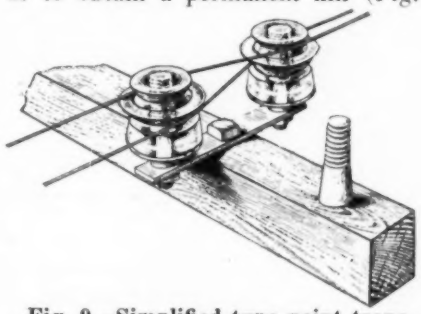


Fig. 9—Simplified type point transposition fixture.

Buried Wire for Rural Construction

CONSIDERABLE interest is again being shown in buried wire for

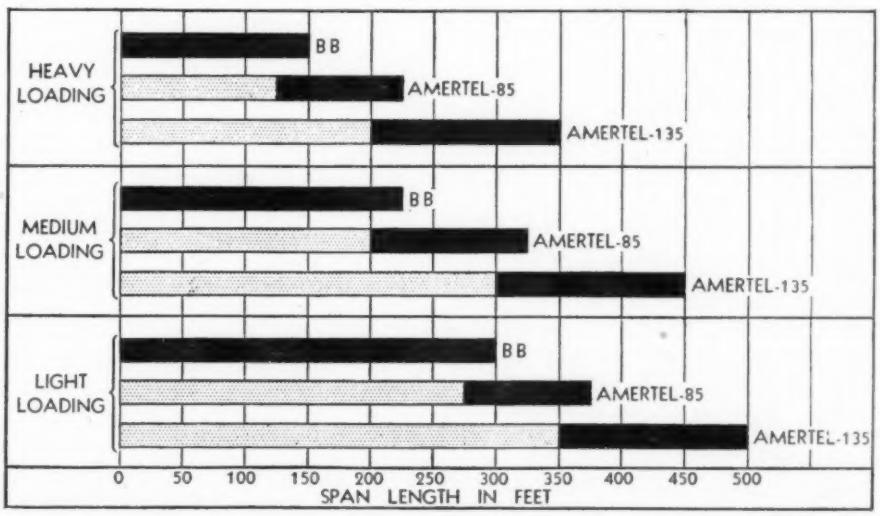


Fig. 7—Comparative field of use of several types of iron and steel wire.

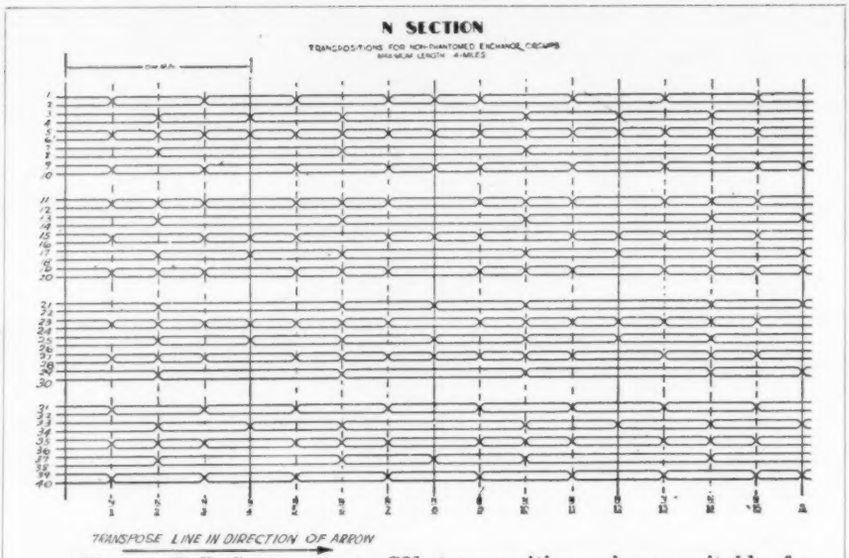


Fig. 8—Bell System type GN transposition scheme suitable for rural line.

rural lines. This construction has worked out well in some sections of the country while giving trouble in other sections. Before adopting this type of construction, Plant Superintendents should satisfy themselves that it is suitable for the locality in which it is to be used. Check with other companies in nearby communities that may have tried this type of construction and get their report.

Buried wire has been found unsatisfactory in northern states where frost penetrates below the point at which the wire is placed. Cracking of frozen ground apparently causes the insulation of the drop wire to pull apart and the entrance of moisture places the pair in trouble. Some trouble has been experienced with buried wire due to the tendency of a lightning discharge to follow down fence posts and tree roots and to then get on the buried wire causing insulation breakdown. The use of copper shield wires has, of course, minimized this trouble to some extent.

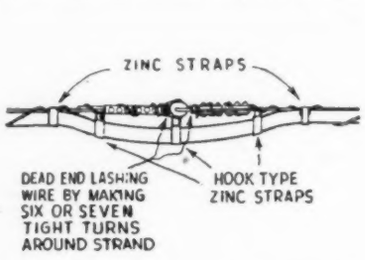
Cable Construction

THE WRITER was recently surprised to observe some of the smaller companies are still using cable rings rather than lashed cable construction. As has been repeatedly pointed out, lashed cable tends to restrict the longitudinal movement of aerial cable due to expansion and contraction thereby minimizing sheath breaks and fatigue cracks (*See Fig.* 11). Wear at supporting points is virtually eliminated with standard lashed construction. A small company with only a small amount of cable to be placed and not having enough use for a cable spinner to justify the investment could either borrow a spinner from some nearby larger company, or if necessary, spin the cable by hand. Features of lashed cable construction are shown in Fig. 12.

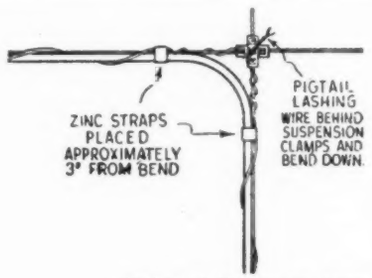
Buried Cable

DURING THE construction season there are always a few courageous pioneers that decide to "go underground" with the cable plant. The idea seems logical but the methods employed in placing cable directly in the earth are often not so good. While ordinary lead sheath cable has, in some instances, been placed directly in the soil without any protective covering and has given years of service, this should be regarded as the exception rather than the rule. So much trouble has been experienced by companies that have tried to bury cable directly in the soil without any protective covering as to make it a highly hazardous undertaking.

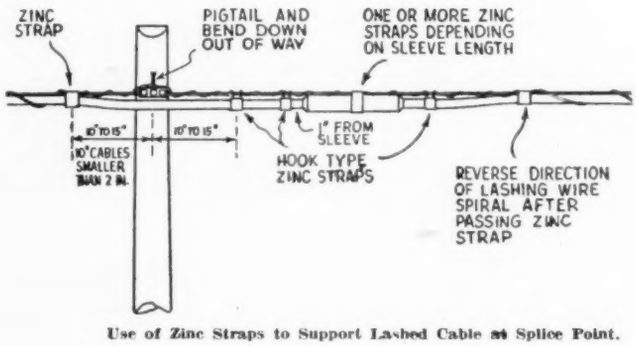
If underground cable plant seems desirable ordinary cable placed in conduit should be used, or jute pro-



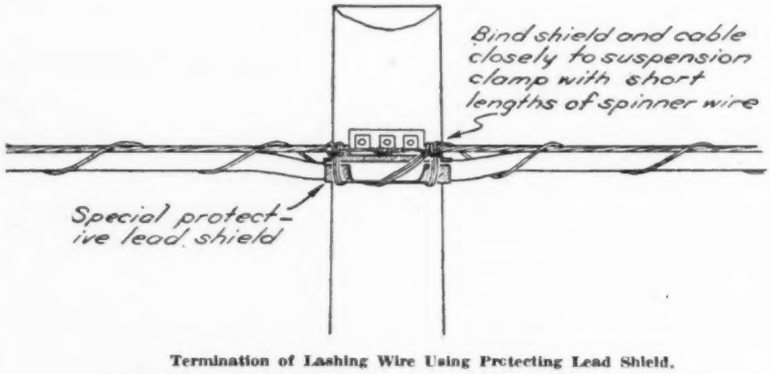
Use of Hook Type Zinc Straps to Carry Cable Around Strand Splice.



Method of Making an Aerial Turn.


ZINC STRAP
PIGTAIL AND BEND DOWN OUT OF WAY
ONE OR MORE ZINC STRAPS DEPENDING ON SLEEVE LENGTH
10" TO 15"
10" TO 15"
10" CABLES SMALLER THAN 2 IN.
1" FROM SLEEVE
HOOK TYPE ZINC STRAPS
REVERSE DIRECTION OF LASHING WIRE SPIRAL AFTER PASSING ZINC STRAP

Use of Zinc Straps to Support Lashed Cable at Splice Point.



Termination of Lashing Wire Using Protecting Lead Shield.

Fig. 11—Features of lashed cable construction.

Fig. 10—Chemical now offer possibilities for reducing tree control costs.

tected, or jute-steel armor protected cable can be placed directly in the soil. Where there is little possibility of mechanical damage, jute protected cable, which is substantially cheaper than the tape armored type, will prove very satisfactory. This cable, because of its asphaltic coating, will give years of service without danger of chemical corrosion.

In the small exchanges where entering aerial cables are to be placed underground at points close to the office, tubular conduit of either the asbestos-cement type or the bituminous fibre kind will be found easy to work with. This conduit is available in a 3¼" diameter bore and 8-foot lengths. Both types use a special slip fit coupling arrangement that insures smooth tight fitting joints. Tubular duct can be laid directly in the ground where the location of the duct run is such that no heavy traffic passes over it. If placed in a location which will carry traffic, it should preferably be supported and encased in concrete. This type of construction is suitable for cable runs up to three ducts. For larger multiple runs, tile duct is recommended.

Joint Use Versus Non-Joint System

IF EXTENSIVE repairs or reconstruction of town plant is required the advantages of joint construction with the local power company should not be overlooked. Joint plant is standard practice with most of the larger companies as it is recognized to be safer, more sightly, and possibly cheaper (though this is doubtful). If joint construction is to be undertaken, standard safety code clearances should be followed to the letter as it is the obligation of both the telephone and the power companies to maintain standard clearance on all joint construction.

Handling of Strand

STEEL STRAND because of its weight and stiffness is somewhat harder to work with than line wire. Because of the important part which steel strand used for cable messenger and down guys plays in outside plant it is essential that standard approved practices be followed in the placing of strand. Such construction features as strand splicing, method of attachment to poles, dead ending methods, etc. are particularly important. The practices followed by the larger companies can be adopted with safety. *Fig.* 13 illustrates some of the most important features of strand construction.

Corner Poles And Dead Ends

THE OLD axiom that "a chain is no stronger than its weakest link" applies with equal emphasis to line

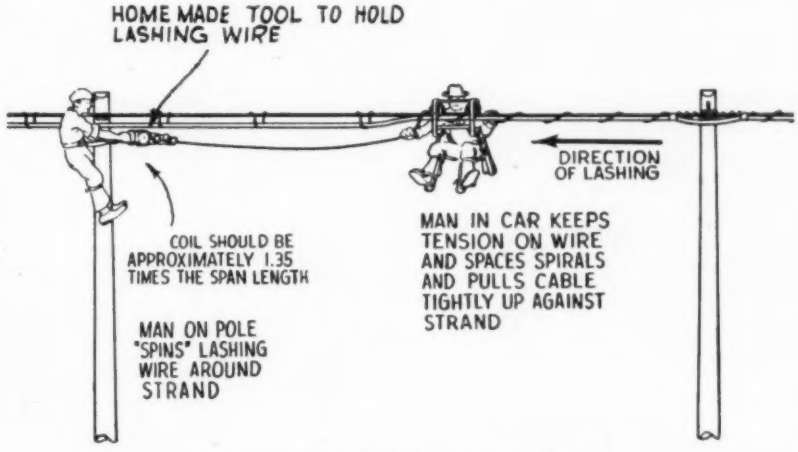

HOME MADE TOOL TO HOLD LASHING WIRE
DIRECTION OF LASHING
COIL SHOULD BE APPROXIMATELY 1.35 TIMES THE SPAN LENGTH
MAN IN CAR KEEPS TENSION ON WIRE AND SPACES SPIRALS AND PULLS CABLE TIGHTLY UP AGAINST STRAND
MAN ON POLE "SPINS" LASHING WIRE AROUND STRAND

Fig. 12—The hand-lashing method.

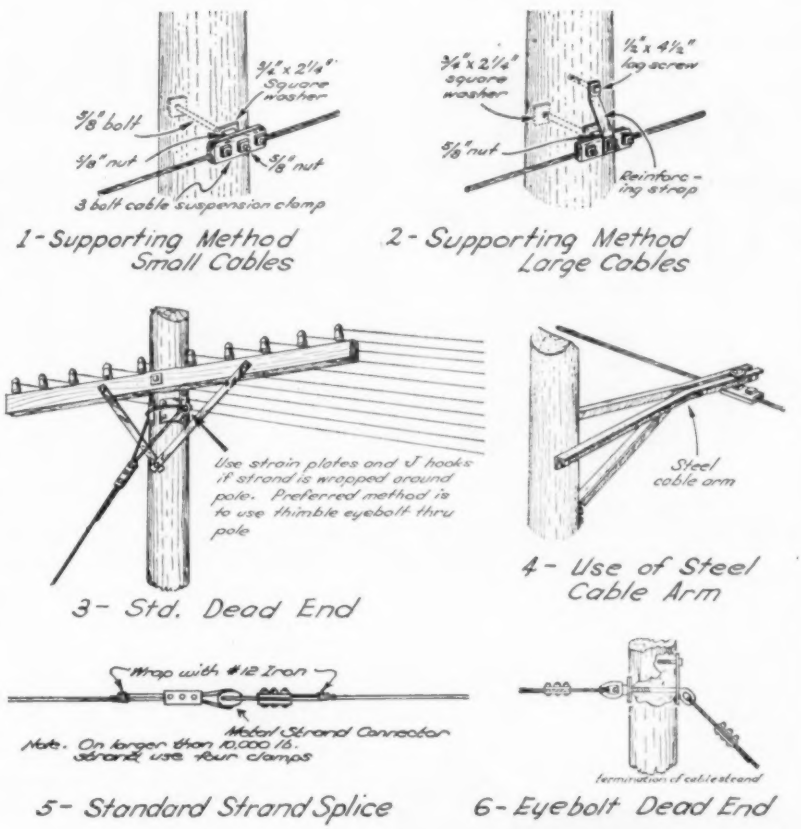
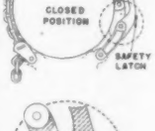

3/4" x 2 1/4" Square washer
5/8" bolt
5/8" nut
5/8" nut
3 bolt cable suspension clamp
1 - Supporting Method Small Cables
3/4" x 2 1/4" square washer
1/2" x 4 1/2" lag screw
5/8" nut
Reinforcing strap
2 - Supporting Method Large Cables
Use strain plates and J hooks if strand is wrapped around pole. Preferred method is to use thimble eyebolt thru pole
3 - Std. Dead End
Steel cable arm
4 - Use of Steel Cable Arm
Wrap with #12 Iron
Metal Strand Connector
Note. On larger than 10,000 lb. strand use four clamps
5 - Standard Strand Splice
termination of cable steel end
6 - Eyebolt Dead End

Fig. 13—Use standard practices in handling strand.

CHANCE PLATFORMS
Simplify tedious repair jobs

C4711

1. GRIP TREAD
2. LIGHT WEIGHT ALUMINUM PARTS
3. FOLDING BRACE
4. SAFE LOCKING CHAIN TIGHTENER



The Chance Utility platform reduces fatigue for linemen doing prolonged repair jobs in confined areas. It is light in weight with fittings cast of heat-treated aluminum alloy and is easily attached with a new type lever chain tightener that locks automatically and cannot be accidentally released.

The platform surface is coated with a plastic grip tread that will not crack, chip or peel off. Brace may be folded flat for easy transportation. Working load 500 pounds.

CHANCE CABLE CARS

MAKE CABLE WORK EASIER, SAFER

1. HAND BRAKE
2. RUBBER TREAD WHEELS
3. STURDY STEEL FRAMES
4. ADJUSTABLE HEIGHT
5. REINFORCED SEAT

The No. 27 Chance Cable Car is built to meet the most exacting specifications for safety and performance. The hand brake stops the car and holds it anywhere on the messenger. Lightweight Aluminum rubber cored wheels ride smoothly over hundreds of thousands of rings without appreciable wear. Sturdily constructed steel frame and reinforced seat will last a lifetime—seat is easily detached and adjustable in height for comfort and convenience.

Chance Cable Cars were used by the Armed Forces. They are built to give you the same exceptional service. For more information, write today.

A·B·CHANCE CO. · CENTRALIA MISSOURI

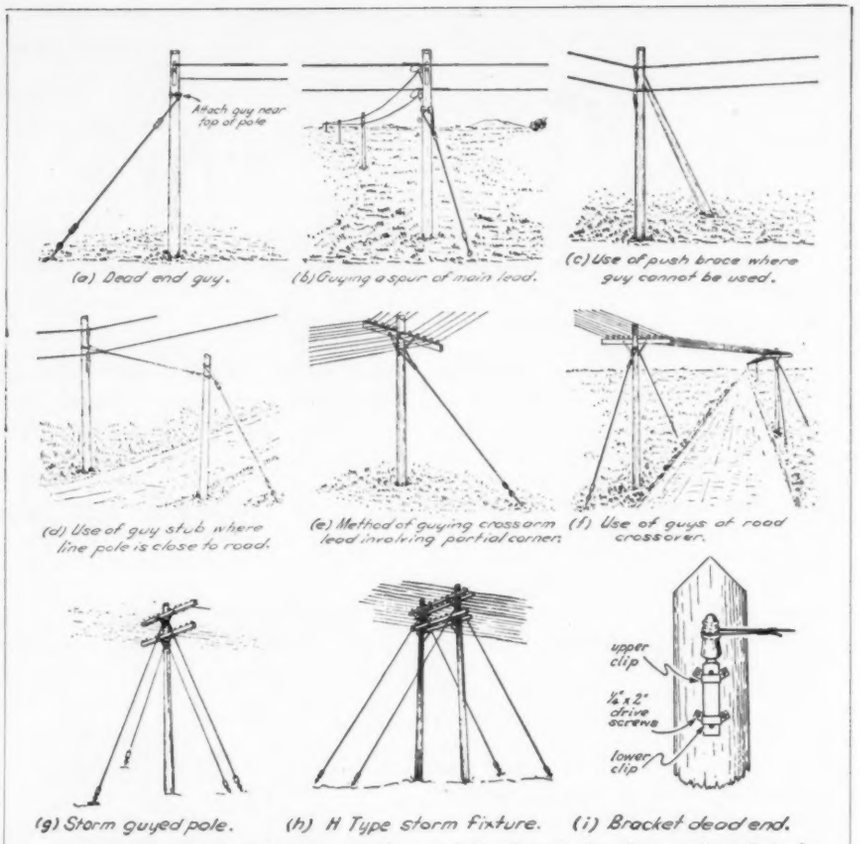

Attach guy near top of pole
(a) Dead end guy.
(b) Guying a spur of main lead.
(c) Use of push brace where guy cannot be used.
(d) Use of guy stub where line pole is close to road.
(e) Method of guying crossarm lead involving partial corner.
(f) Use of guys at road crossover.
upper clip
1/4" x 2" drive screws
lower clip
(g) Storm guyed pole.
(h) H Type storm fixture.
(i) Bracket dead end.

Fig. 14—Don't let corner poles and dead ends be the weak points in your leads.

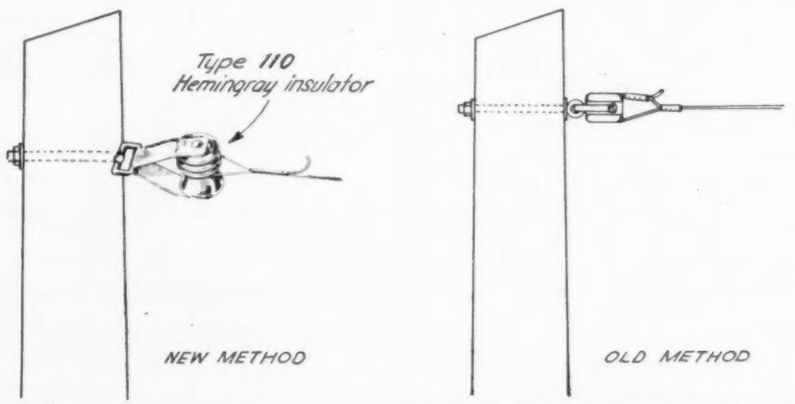


Fig. 15—Comparison of new and old methods of dead ending long spans.

construction with respect to dead ends and corners. Corner and dead end poles should preferably, be a size larger than line poles, and should be adequately anchored. Standard practices should be followed in placing dead end and corner fixtures. (*See Fig.* 14).

Improved Dead-Ending Insulator

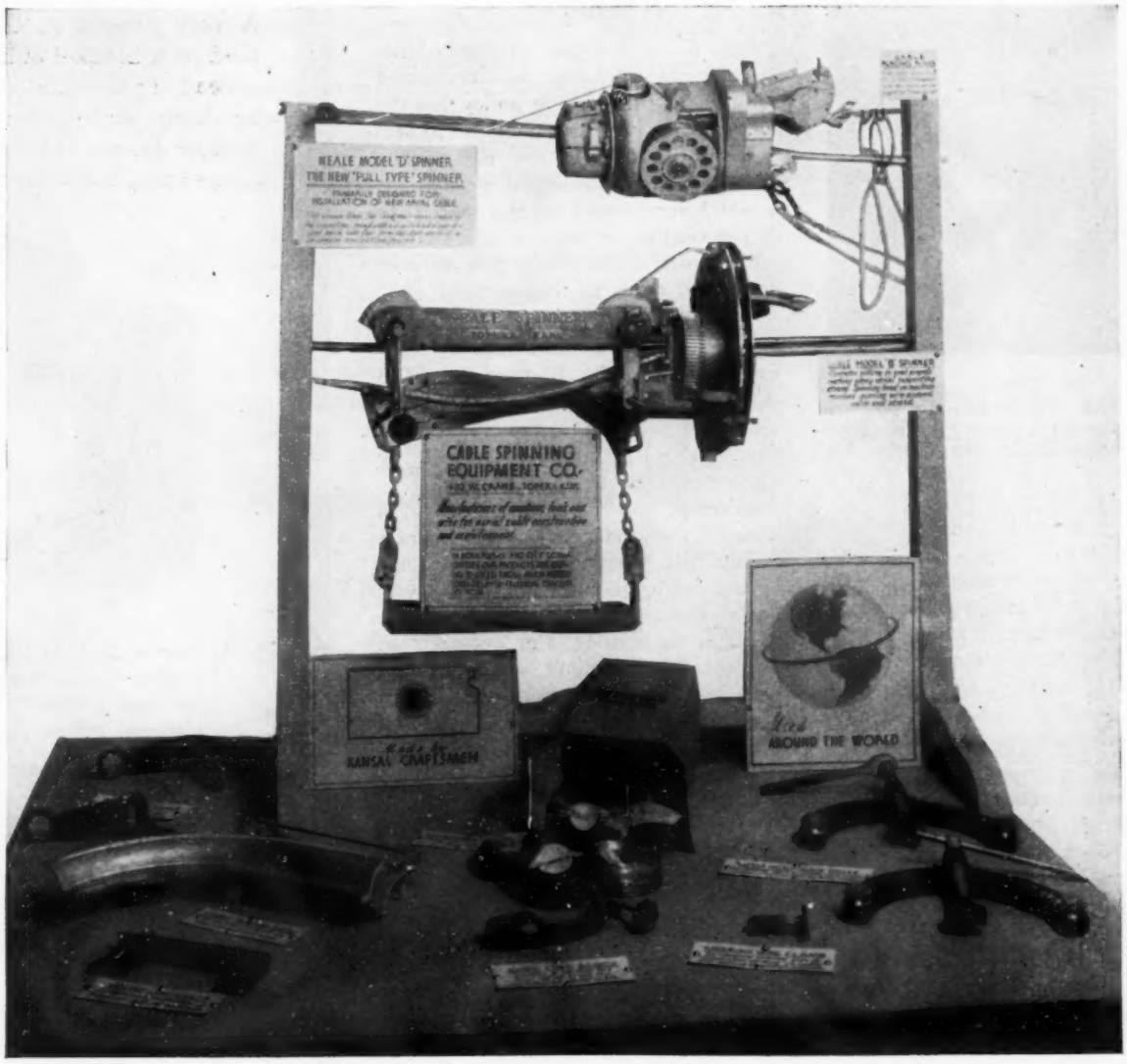
MANY COMPANIES have been using the porcelain strain insulator and clevis arrangement for long span dead ends as shown in Fig. 15. Due to the short leakage path over the insulator to the metal clevis, considerable line leakage takes place during wet weather. The resultant unbalance causes rural lines which are heavily paralleled by rural power lines, to show a marked increase in noise during wet weather. This problem can now be minimized by the use of the new No. 110 Hemingray insulator. This insulator is suitable for use with spans of 300 to 400 feet. It has low leakage due to its triple underskirt rings. An exceptionally deep petticoat lessens the leakage to the metal clevis. *Fig.* 15 illustrates how this insulator is used in connection with cross arm construction.—THE END.

Your Winning Team

On new construction or reconstruction . . .

An unbeatable combination of tools with "BUILT-IN KNOW-HOW"

To Help YOUR Crews Reduce YOUR Costs


NEALE MODEL 'D' SPINNER
THE NEW 'PULL TYPE' SPINNER
CABLE SPINNING EQUIPMENT CO.
Made by KANSAS CRAFTSMEN
Work AROUND THE WORLD

CABLE SPINNING EQUIPMENT CO.

TOPEKA, KANSAS

Pennsylvania Telephone Corp. Issues 50th Anniversary Publication

Few company histories have done a more constructive job of interpreting the American competitive business system than "The Flight of Speech," fiftieth anniversary publication of the Pennsylvania Telephone Corporation, Erie, Pa. As one of the largest and oldest Independent telephone companies in the country, Pennsylvania Telephone Corporation has a right to speak for that industry. The story which it presents is far more than the chronology of an individual business enterprise. It is a factual account of an American popular protest against monopoly and of the results which this revolt achieved in terms of better and cheaper telephone service.

HARRY M. ENGH, president of Pennsylvania Telephone Corp., Erie, and his associates issue valuable booklet commemorating company's 50th anniversary.

One of the surprising facts to emerge from this interesting chronicle is the extent of the Independent telephone industry in this country. Few telephone users, if asked to hazard a guess, would believe that there are in the United States, outside of the Bell System, some 6,400 Independent telephone companies, each a separate financial and operating unit, not to mention some 40,000 local rural telephone exchanges, mostly cooperative in organization. Equally surprising is the fact that, geographically, two-thirds of the nation is dependent upon the Independent telephone industry for telephone service.

"The Flight of Speech" gives the background of the independent telephone movement and interprets it in terms of one of the most successful exponents of the independent concept. Fascinating highlights in the early competitive struggle between the Bell system and the Independents (now happily a thing of the past) enliven the story. And the book makes clear, in no uncertain terms, just how difficult and complex is the present-day problem of maintaining our national intercommunication system.

The book, which was written and produced by William E. Rudge's Sons, New York, is an attractive volume of something over 100 pages, well illustrated with pictures, graphs, and organizational charts.

◆

Reaffirmation of the 20 Per Cent Ruling

The Wage & Hour Division of the Department of Labor has reaffirmed its previous enforcement policy that the switchboard operator exemption in section 13 (a) (11) of the Fair Labor Standards Act will be lost in any case in which an operator devotes more than 20 per cent of her time to non-switchboard work. The policy rule as now reaffirmed reads as follows:

"Section 786.100—**Enforcement Policy Concerning Performance of Nonexempt Work.** The Division has taken the position that the exemption provided by section 13 (a) (11) of the Fair Labor Standards Act will be deemed applicable even though some nonexempt work (that is, work of a nature other than that which characterizes the exemption) is performed by the employee during the workweek, unless the amount of such nonexempt work is substantial. For enforcement purposes, the amount of nonexempt work will be considered substantial if it occupies more than 20 per cent of the time worked by the employee during the workweek."

◆

Rep. Morrison Offers Bill to Eliminate Communications Excises

With communications excise revisions continuing to draw attention on Capital Hill, Rep. James Morrison (D., La.) went farther than the authors of any of the other pending measures affecting the communications levies when he dropped in the House hopper a bill calling for the complete elimination of all excises on communications services—telephone, telegraph, international radio, and cable.

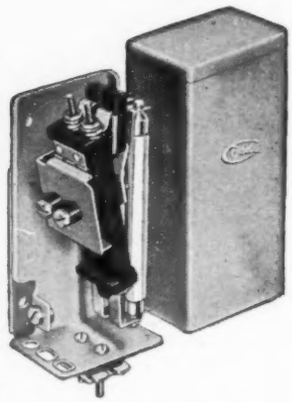
Meanwhile, it is understood that the House Ways & Means Committee will report out its general tax overhaul measure, including probably some revision of excises on communications services, late in April.

STROMBERG—C

cook type RO

outdoor sub-station protector

A very rugged Protector, assembled on a bracket of heavy steel—instead of porcelain—to take rough handling and subscriber abuse without danger of breakage. Other outstanding features:



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3. Mountings contain heavy studs for connecting drop wires and ground.
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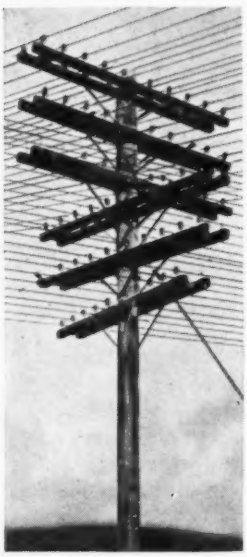

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Safety Atop the Pole & on the Ground

(*Continued from page 49*)

portant to production, to quality of products, to safety and to efficiency and morale of the entire organization, that competent management pays very careful attention to it.

Although stairs and fixed ladders specified in detail in building plans are usually reasonably satisfactory in design and construction, sometimes faulty installation creates one or more of the following hazards:

Stairs: Risers not of equal height; risers not filled in (inside stairs); treads not of equal width; split, worn, or uneven treads; treads too narrow; treads slippery or sloping outward; no nosing; loose or missing railing; lack of hand clearance at railing; stairs too steep; inadequate lighting; no toeboards on stair landings; stair flights too long (10 feet vertical height maximum without intermediate landings; or stair landings too narrow (not less than 3 feet 6 inches).

Fixed ladders: Uneven rung spacings; bent, loose, or missing rungs; lack of toe clearance at back of latter; ladder loose; lack of hand holds at top of ladder; ladder sloping outward at top; slippery rungs and rails, or lack of cage on ladders over 20 feet long.

ABOUT ONE-THIRD of all ladder accidents are due to failure to secure ladders after putting them in place. Lack of non-skid bases, failure to provide for holding ladders, or failure to lash ladders at the top or bottom are important unsafe methods. Insecure grip on rails or rungs is the leading unsafe act. (*See illustration*).

The constant use of ladders throughout the telephone industry makes frequent ladder inspections an important accident prevention measure. Accident reports prove that often hazardous ladder conditions that go unreported and uncorrected result in accidents. Among the common conditions often found during inspection of ladders are the following:

Portable straight ladders: Broken, missing, or loose rungs; unsound, improper, or weak material; unevenly spaced rungs; rungs poorly secured; split or patched rails; lack of proper feet; lack of batter, and lack of cross braces.

Stepladders: Broken, missing, or loose steps; split or broken side rails; broken or missing spreaders; too light construction, and poor material.

Portable steps: Poor construction; uneven step spacing; lack of railings, and overhanging.

Horses: Ends overhanging supports, and weak, missing, or loose bracing.

(*To be continued in the May issue of TELEPHONE ENGINEER AND MANAGEMENT.*)

Face Ladder When Ascending Or Descending – avoid injury
DO
DO face ladder and hold it with both hands when ascending or descending. See that ladder is placed so that work is accessible without excessive reaching.
DON'T
DON'T slide down a ladder, nor attempt to ascend or descend with back to ladder.
Keep Tools In Proper Holders – avoid injury
DO
DO keep tools and other materials being used while on a ladder in a safe type of holder, secured to person or ladder. Use a hand line to convey tools or materials to the top of a ladder, or have some one hand them to you.
DON'T
DON'T place tools or materials on a ladder where they will drop off and injure some one below. Do not carry things in your hands up or down a ladder . . . keep your hands free for holding on to ladder.

"Most injuries result from a combination of physical injuries and faulty behaviour."

ARE

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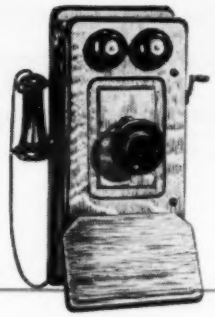

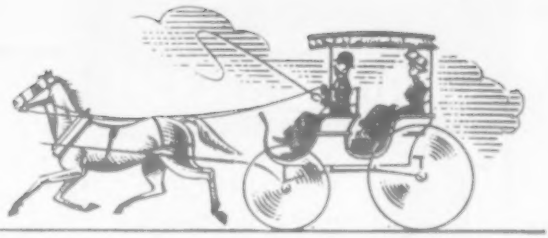

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Whether your subscribers want a desk telephone or a wall telephone—this one unit does the job! It can be changed from desk to wall mounting simply by reversing the position of the cradle. Write today for complete information. Dept. G549.

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Texans Map Pace-Making Plans

(Continued from page 58)

interests of the telephone company and the public in the particular area. But why are these specialized common carriers springing up? There may be a number of answers to that question, but one seems to be that the telephone companies do not have available a limited type dispatch service at rates which certain types of users, because of their peculiar requirements, can afford to pay.

"The foregoing discusses a new service concept which may merit serious consideration by our industry. It has **not** been brought to your attention with the thought that you should immediately do something about it. After considering it at length and modifying it as your judgment dictates, possibly you will want to do something about it. But regardless of that, it seemed to me that in the interest of keeping informed, you would like to have these views which—as pointed out in the beginning—are in the nature of a reaction of myself and others to testimony given at the FCC hearings."

The Tuesday session featured addresses by Clyde S. Bailey, executive vice president, United States Independent Telephone Association, Washington, D. C., Irvin Mattick, Southwestern Bell Telephone Company, St. Louis, Mo., and C. D. Sheffield, Southwestern Bell Telephone Company, Houston.

Following the address of Mr. Bailey at the Tuesday morning session, E. C. Blomeyer, Chicago, Judge S. A. Lindsay, Tyler, Texas, and Colonel G. B. Dickson, vice president of International Telephone & Telegraph Company, New York City were introduced and addressed the meeting.

Also featured during the Tuesday sessions were the Plant Conference conducted under the chairmanship of Morris S. Burton, and the Accounting conference conducted by Dick Robb.

Roy Keller of Runzel, Chet Ruth, Cook Electric, and Bud Runzel and Bob Saunders of Runzel inspect equipment displayed at Texas convention.

Officers elected at the March 17 meeting of the Texas Chapter, Independent Telephone Pioneers were: Howard Hously of Dallas, president; J. E. Robbins of San Angelo, vice president, and Marvin Atkins of Bryan, secretary-treasurer.

Principal speaker at the pioneer session was R. C. Reno, editor of Telephony of Chicago, who outlined the two major aims of the group as first, promotion of the preservation and expansion of private enterprise, and second, to perpetuate the fellowship and friendship.

Other speakers at the final session on March 17 sessions were J. E. Robbins of San Angelo who explained "Force Adjustment for Smaller Offices," and Mrs. Mayme Workman of Springfield, Ill., who gave an address on "Developing Our Normal Customer Service."—THE END.

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The Terminal-Per-Station Plan For Party Lines in Automatic Exchanges

By JEROME BABKA
Systems Engineer,
Automatic Electric Company

AN IMPORTANT consideration in any project for automatic conversion or installation is how connections are to be arranged at the central office to provide for selection of party line stations. Two practical methods are available, each posing certain problems: the *Terminal-Per-Line* plan and the *Terminal-Per-Station* plan.

These designations would lead one to infer that under the Terminal-Per-Station plan each station on a party line is assigned an individual connector bank terminal, while under the Terminal-Per-Line plan all of the stations on a party line are assigned the same connector bank terminal. Such an assumption is correct, but differences between the two plans involve far more than assignment to an individual or common bank terminal.

Since there are a number of detail methods available within each general plan, a full comparison of the two plans would be lengthy and confusing. This article accordingly makes only an occasional necessary reference to the Terminal-Per-Line plan, and limits itself mainly to discussing the features of the Terminal-Per-Station plan. It is well to bear in mind that the latter is the automatic equivalent of the Jack-Per-Station plan used in manual practice.

Initial consideration discloses a number of advantages peculiar to the Terminal-Per-Station plan, including:

(1) Improved efficiency of outside plant facilities.
(2) Equalization of originating traffic loads.
(3) Simplicity of intercepting scheme.
(4) Ease of making changes in class of service.

These four advantages will be explained after clarification of the plan's basic features.

Line and Connector Terminals

IN THE Terminal-Per-Station plan, by definition the number of connector terminals exceeds the number of line terminals by an amount which depends on the proposed number of party line stations. Consequently, separate distributing frame terminations are required for cross-connecting facilities. A separate Line IDF (associated with an MDF) affords the best arrangement. Although a combined MDF and Line IDF offering modified Line IDF facilities may also be used, jumper congestion will limit its practical application. The Line IDF, it should be noted, is widely used in both Terminal-Per-Line and Terminal-Per-Station schemes.

A review of what occurs while a connection between two subscribers is being established through Strowger Automatic equipment will make it clear why there must be more connector terminals than line terminals.

When the calling subscriber lifts his handset, an electrical circuit is extended from his telephone through exchange switching equipment consisting of line equipment, linefinder and first selector. From this point on, completion of the connection is under the control of impulses from the calling subscriber's dial. Dialing (say) a four-digit number extends the connection step-by-step from first to second selector, and from second selector to connector. From the called party's connector bank terminal the connection is further extended to another line equipment (associated with the called party's line), and thence out to the called station. If the line is idle, ringing current is sent out to the called station from the ringing machine by the action of the connector.

It will be observed that the above connection uses two line equipments, one associated with the calling line and the other with the called line. In other words, there is one line equipment associated with each telephone line whether it is an individual line or a party line. A line equipment (also called a line relay group) consists of two relays, with or without a mechanical line lockout, or of three relays (line relay, line cut-off relay, and line lockout relay).

While one line equipment is required for each line, it is obvious that an individual line will require one connector bank terminal, that a two-party line (two stations on a line) will require two connector bank terminals, and that a four-party line will require four.

Based on the above, a typical installation with 2000 lines in various classes of service might require line terminals (line equipments) and connector terminals (subscribers' numbers) as shown in table I:

In this category, telephone engineers do not speak in terms of the number of lines assigned for party-line service, but rather the number of connector terminals.

In the typical installation above, it will be noted that there are 850 more connector terminals than line terminals. Consequently 8½ groups

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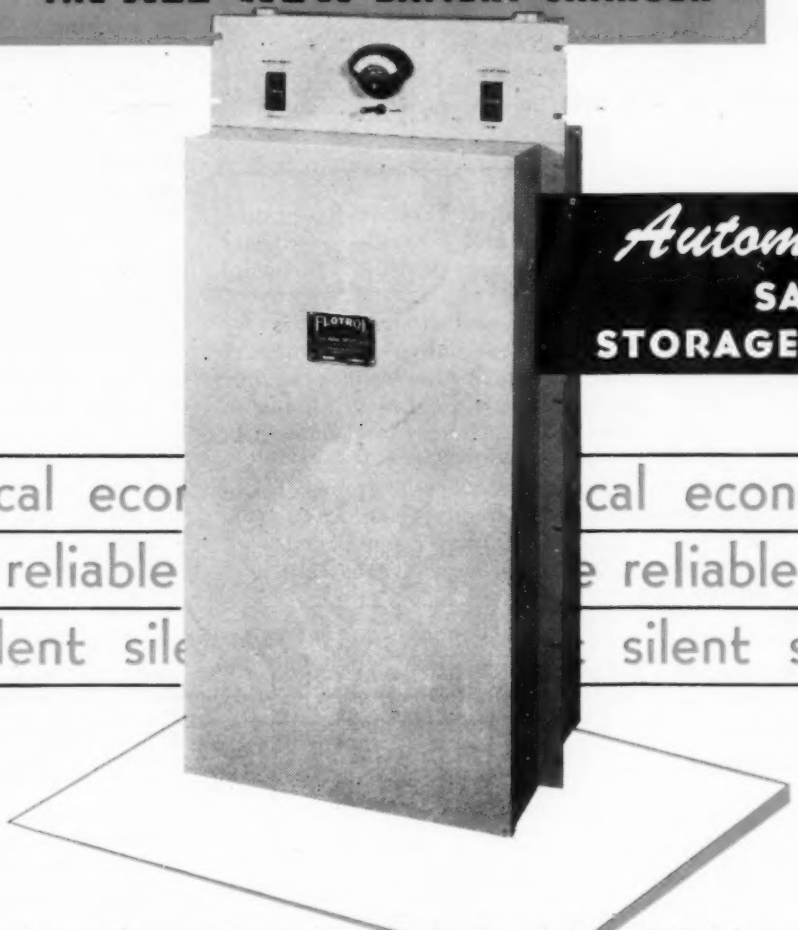

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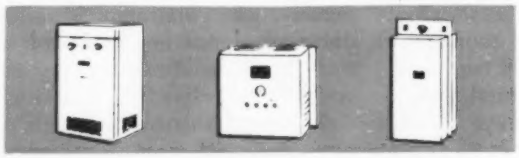
Automatic savings are always welcome in these expensive times. And you will find these savings automatically in the trouble-free operation of Flotrol. Flotrol saves your battery's life by doing your battery's work. Peak loads are automatically compensated for by the dependable Flotrol. It keeps your battery ready, willing, and able.



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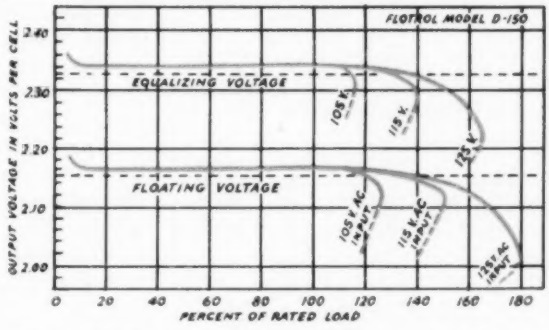
½ amp.	24 volts	1.5 amp.	50 volts
1 amp.		3.0 amp.	
3 amp.		6.0 amp.	
6 amp.		12.0 amp.	
12 amp.		24.0 amp.	

Three phase units in 25, 50, 75, and 100 amp. 50 volt ratings.

(Ask about the Dual Range Models.)



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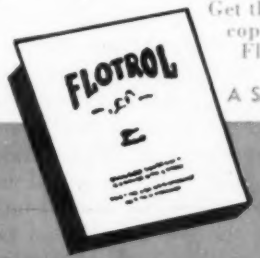

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3- and 4-party)		800	8
PBX	200	200	2
Pay Station	50	50	½
TOTALS	2000	2850	28½

Table I—Typical installation with 2000 lines in various classes of service.

(actually 9 groups) more of connector hundreds would be required under the Terminal-Per-Station plan than under the Terminal-Per-Line plan.

The increase in connector equipment groups required is, however, largely offset by a reduction in intercepting equipment necessary, simpler connector equipment, and perpetual benefits in plant facilities. Moreover, since it may be assumed that the total initial connector installation may not be needed for service immediately, a part of the increased connector equipment may be regarded as standby facilities, ready to provide immediate service to new subscribers without the need for additional line equipments.

Ringing Schemes—One-Ring and Two-Ring Codes

THE TERMINAL-Per-Station plan may be arranged to employ any one of several different party line ringing schemes, such as one-ring and two-ring codes (using a single frequency), harmonic ringing (using several frequencies), superimposed ringing (as in Bell practice) and ten-code ringing (with combinations of long and short signals). Although usually excepted, multi-party rural lines can also be handled in a Terminal-Per-Station plan. The first two ringing schemes mentioned are described in detail below.

One-ring and two-ring codes for signaling on individual, two-party and four-party lines employ audible signals of one frequency, usually in the lower ranges (for example, 20, 25 or 30 cycles).

Figure 1 shows four groups of connector hundreds (2100, 2200, 2300 and 2400), each group capable of handling ten simultaneous calls over any ten of its hundred connector terminals. The connectors in the first three groups are one-ring connectors assigned to individual and two-party lines, and the first and second parties of a four party line group. Those in the "2400" group are two-ring connectors assigned to the third and fourth parties of a four-party line group.

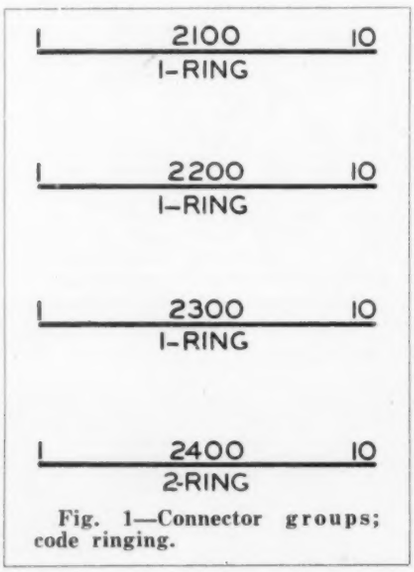


Fig. 1—Connector groups; code ringing.

Fully selective divided ringing is given the two-party lines, and the first and second parties of four-party lines prior to their eventual full use. Figure two shows how the telephone ringers are connected for this fully selective divided ringing. (The ringing circuit should not be confused with the talking circuit.)

The current from one side of the ringing circuit is extended from the ringing machine to the connector, and from the connector over either the positive (+) or the negative (—) lead of the connector bank to a distributing frame. The polarity of these two lead should be disregarded, since it has no bearing on the ringing circuit. The ringing circuit completes a loop from the ringing machine via one connector lead (as indicated in the connector circuit) and one line wire to the telephone ringer to the ground and back to the ringing machine.

Assume that the connector circuits provide for extending the ringing current over the negative (−) lead in all cases. At the Line IDF the negative lead from the connector bank for station 1 is cross-connected "straight" to a terminal connecting to one side (either side) of the telephone line. The negative lead from the connector bank for station 2 is cross-connected in reverse so as to reach a terminal connecting to the opposite side of the line. The ringer of station 1 is connected from one side of the line to ground, while the ringer of station 2 is connected from the opposite side of the line to ground.

With two-party line service, when station 1 is called, the one-ring signal is not heard at station 2. Conversely, when station 2 is called, the one-ring signal is not heard at station 1. Thus the two-party ringing is "fully selective."

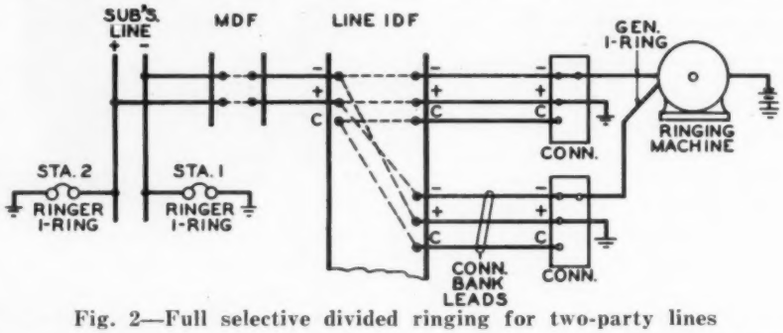


Fig. 2—Full selective divided ringing for two-party lines

When the third and fourth parties are connected to a four-party line, however, all stations on the line are placed on a semi-selective divided ring basis. The connection for the four stations is indicated in Figure 3. The reversal of jumpers for the ringing generator lead as shown for stations 2 and 4, can also be accomplished by strapping the associated terminals at the four-party line bunching blocks. The ringers of stations 1 and 3 are connected from one side of the line to ground, while the ringers of stations 2 and 4 are connected from the opposite side of the line to ground. When station 1 is called, the one-ring signal is also heard at station 3. When station 3 is called, the two-ring signal is also heard at station 1. Each station answers to its correct signal only. A

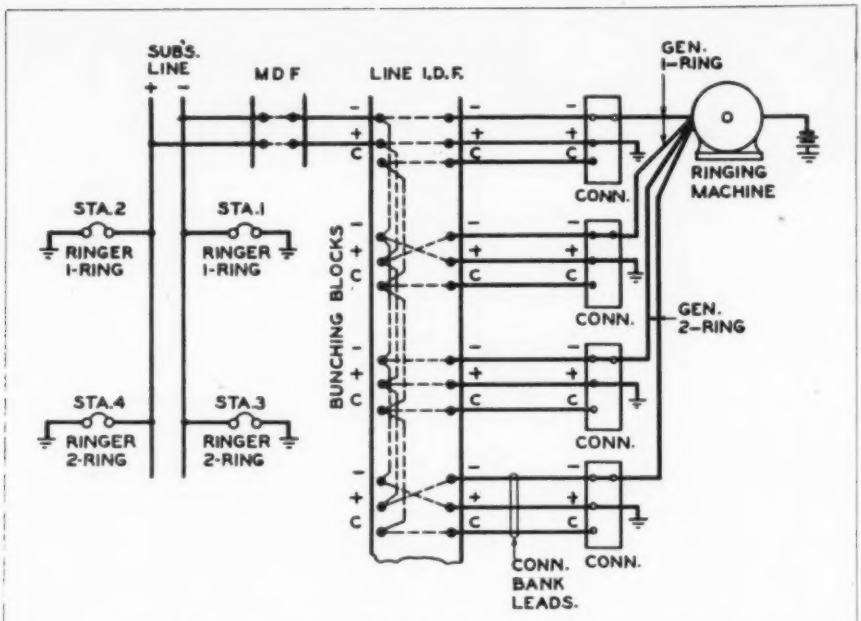


Fig. 3—Semi-selective divided ringing for four-party lines

similar operation takes place when stations 2 and 4 on the opposite side of the line are called.

Individual lines are connected initially for bridged ringing in preference to divided ringing. This is indicated in Figure 4, which shows the ringer connection across the line.

Harmonic Ringing

CONSIDER now the Terminal-Per-Station plan wherein the party lines are signaled under the multi-frequency harmonic ringing scheme. For illustration, and for comparison with the one-ring and two-ring code ringing scheme, a similar case employing individual line, two-party line and four-party line service will be discussed.

The harmonic ringing scheme in Figure 5 shows four groups of connector hundreds, each group being arranged to extend current of a distinctive ringing frequency, which differs from the frequencies of the other three groups. Thus an assignment may be made initially to provide for ringing frequencies as follows:

16-⅔ cycles for individual lines and the first parties on two-, three-, and four-party lines;

33-⅓ cycles for the second parties on two-, three- and four-party lines;

50 cycles for the third parties on three- and four-party lines;

66⅔ cycles for the fourth parties on four-party lines.

The telephone company of course makes a fixed assignment of frequencies. However, there is nothing to prevent the use of different combinations of ringing frequencies as the occasion may demand. For example, a combination of any two of the four frequencies may be used for two-party line service, or a combination of any three for three-party line service. Individual lines may be assigned to any one of the frequencies. Four-party line service of course requires that all of the four frequencies be used. This should be borne in mind when bunching party lines at the Line IDF into various groups of mixed frequencies. A book record of the frequencies must be kept.

All the party lines have fully selective bridged ringing. This feature of multi-frequency harmonic ringing is important, since with it only the called station is signaled, the other parties on the line hearing nothing.

Reference to Figure 4 will show how this feature works. Assume additional stations 2, 3 and 4 are connected across the line in the way shown in the figure. Assume further that the ringers of the four stations operate respectively on frequencies of 16-⅔, 33-⅓, 50 and 66-⅔ cycles. When station 1 is called the ringing signal is not heard at any of the other three stations simply because their ringers do not respond to a ringing current of 16-⅔ cycles. Hence each station is signaled individually.

The ringing generator lead need not be reversed at the Line IDF terminals of alternate stations 2 and 4 (shown in Figures 2 and 3), as is required in the case of the one-ring and two-ring code ringing scheme, since the ringers are now bridged across the line.

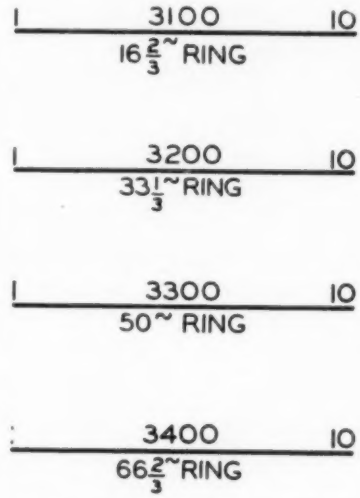


Fig. 5—Connector groups; harmonic ringing.

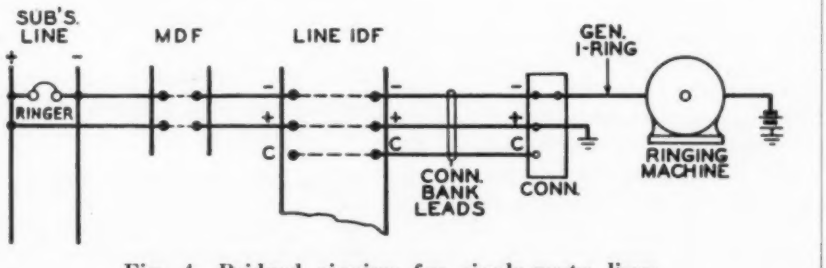


Fig. 4—Bridged ringing for single-party lines.

Party Line Subscribers' Numbers

PARTY LINE subscribers in the Terminal-Per-Station plan are each assigned an entirely separate telephone number, as are individual line subscribers, without any suffix numbers or letters. From the numbering assignment, the general public therefore cannot distinguish between individual line and party line

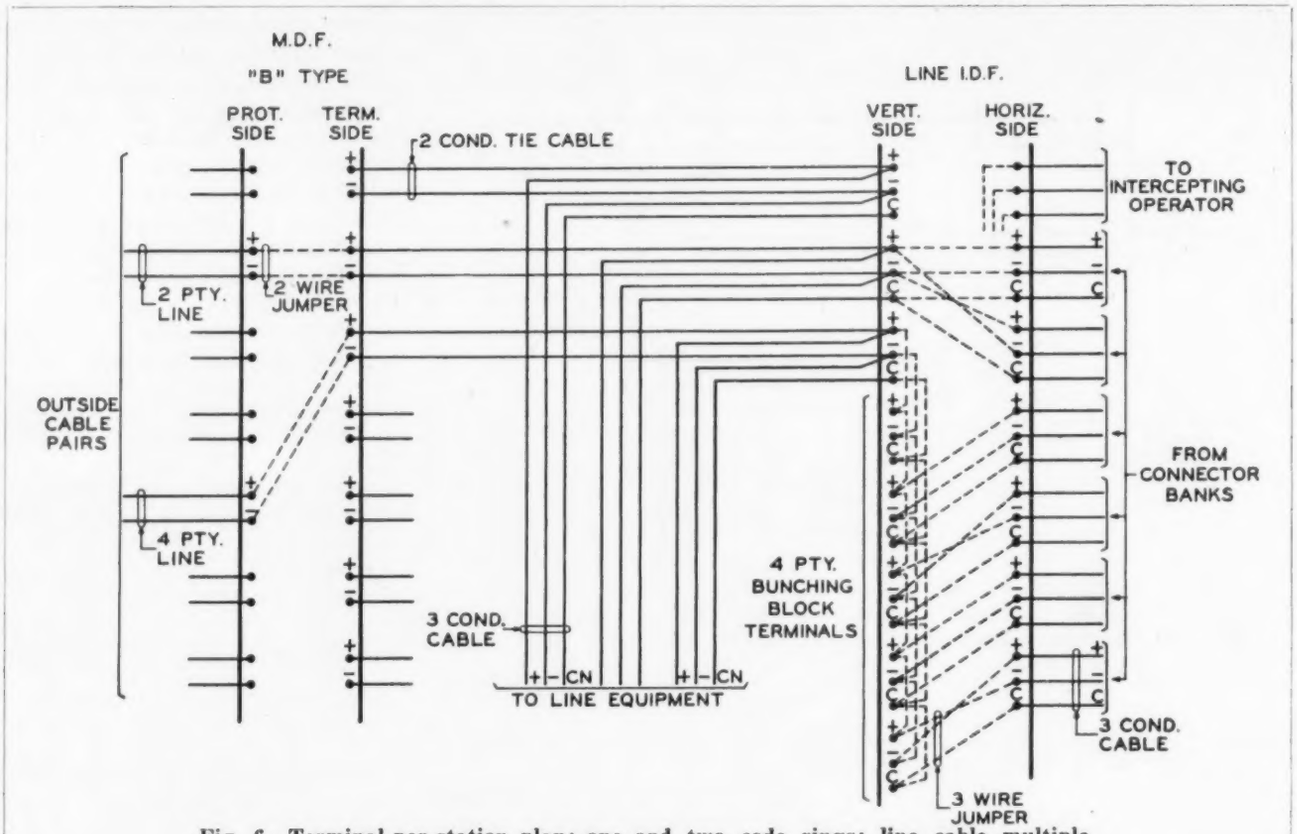


Fig. 6—Terminal-per-station plan; one and two code rings; line cable multiple.

subscribers. Under the one-ring and two-ring code ringing scheme individual and two-party line subscribers and the first and second parties of four-party lines are, as previously stated, signaled by one ring-connectors. Two-ring connectors are used to signal the third and fourth parties of four-party lines, and separate groups of telephone numbers are reserved for these subscribers. The two-ring signal heard by the calling subscriber (as a ring back tone) as well as by the called subscriber directly, would be a clue that the latter is either the third or fourth party of a four-party line. With fully selective harmonic ringing, however, there is no such clue that the called subscriber is on a party line. A slight change in pitch of the ringing tone is negligible as far as the public is concerned. Since telephone numbers have a certain prestige in the business and social worlds, the party line numbering scheme just mentioned proves most satisfactory. In addition, in view of the nationwide toll dialing program now under way, the uniform number of digits in both individual and party line telephone numbers permits speedy and proper functioning of the toll dialing network.

Distributing Frame Arrangement

THE "FULL LINE IDF facilities" accorded under the plan may be obtained by either of two methods of cabling. Take the case of an exchange with a few thousand lines having a sizeable number of two- and four-party lines, an example of which is shown in Figure 6.

The plan in Figure 6 calls for a Line IDF interposed in the circuits between the MDF and the line equipment, and the connector bank terminals. The outside cable pairs (+ and −) are terminated on one side of the MDF, and cross-connected with two-wire jumpers to the opposite side of the frame. They are then carried by cable to the vertical side of the Line IDF, connecting in multiple with the + and − leads from the line equipment.

Note that any party line connector bank terminal can be connected to any available line equipment terminal at the Line IDF, and also that any line equipment terminal can be connected to any cable pair at the MDF. This combination permits redistribution of originating traffic by the changing of jumpers at both frames.

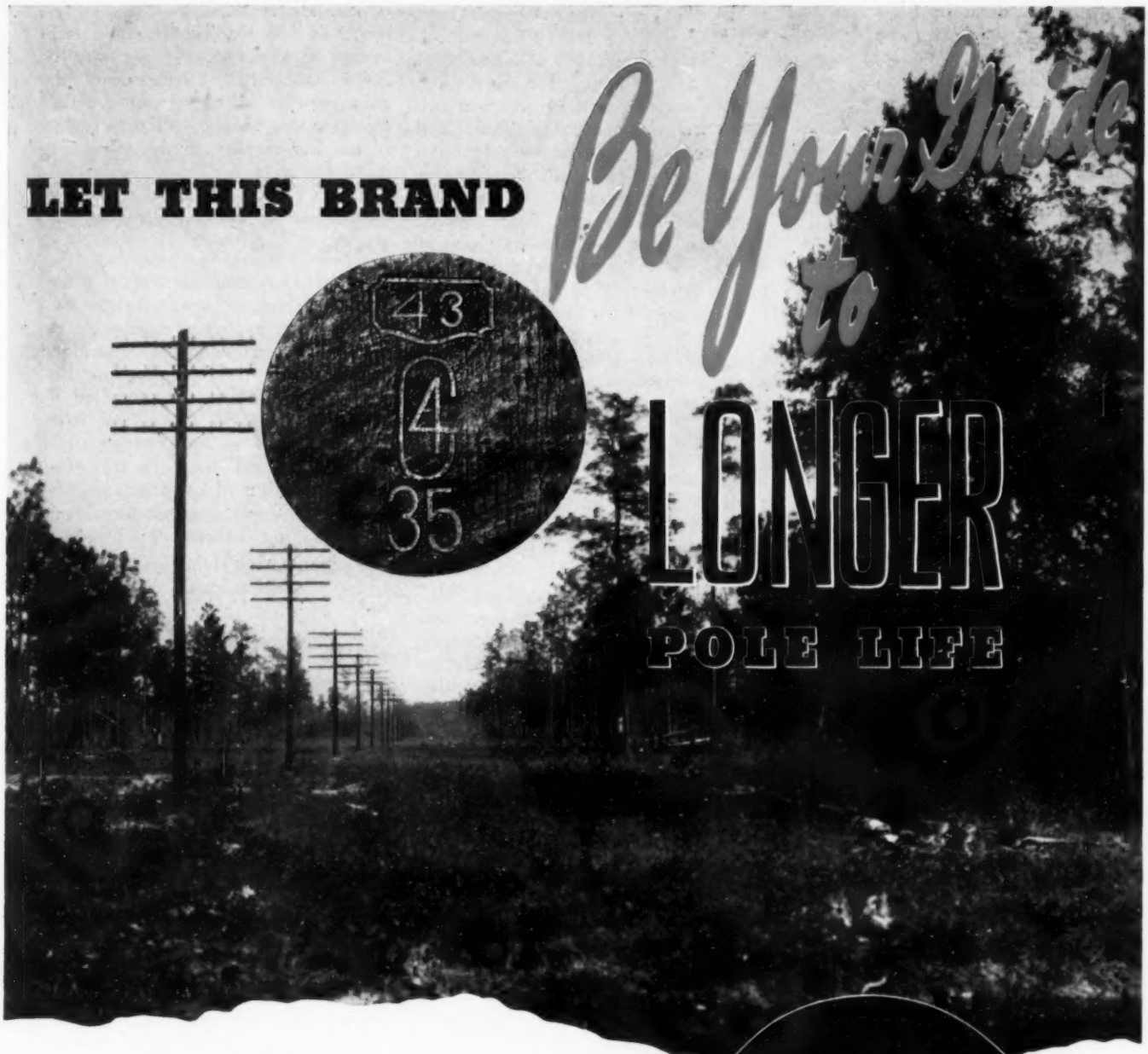
An alternative to the distributing frame arrangement where the line equipment is cabled to the MDF is shown in Figure 7. The same type of equipment is used and interposed in the circuit as in Figure 6, except for the cabling. The connector bank terminal (+ and −) are cabled from the Line IDF to the MDF, and line protection facilities are provided for connector bank terminations rather than the line equipment as in Figure 6.

Even though all of the connector banks are cabled to the MDF, no additional line protectors are required over the number needed in the arrangement shown in Figure 6. However, larger quantities of tie cables and MDF terminal blocks are necessary to provide for jumpering flexibility at the MDF. This increase runs in direct ratio of the number of connector terminals to the number of line terminals.

Redistribution of originating traffic may be accomplished merely by changing jumpers at the Line IDF. Here the simplified jumpering is an advantage, since changes are reduced to a minimum.

Party Line Bunching Blocks

IN THE SWITCH train it is necessary to tie the connector bank terminals to their associated line equipments. This tie or connection



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is accomplished at the Line IDF by means of jumpers, and in the case of four-party lines by means of jumpers and "bunching blocks". (Bunching blocks are not required for two-party lines.)

These blocks permit the bunching of party line terminals to form a group of two, three or four terminals, this group having an outlet to but one telephone line. Thus two, three or four subscribers having widely different telephone numbers can be served over one line. In fact, any subscriber can be assigned or transferred to any particular line at will.

It should be remembered that there is no relation between a directory number (connector terminal) and a line circuit assignment (line equipment). The latter can be changed as desired, but the same traffic load equalization is not possible in the connector groups without a change in the directory number.

The flexibility of cross-connections between outside cable pairs, line equipments and connector terminals offers some distinctive features for the handling of party line service not obtainable in any other arrangement. The four main advantages mentioned at the beginning of this article will now be considered in detail.

Improved Efficiency of Outside Plant Facilities

WHEN NO LINE IDF facilities are provided for party line service, conditions arise where many lines are only partially filled. For instance, there may be one telephone connected to a two-party line, or one or two telephones to a four-party line. Subscribers may have moved, cancelled their contracts or changed their class of service, and the telephone numbers thus vacated cannot be reassigned until the next directory is issued. Such conditions may tie up enough outside cable plant to cause a shortage of cable pairs and telephone numbers.

Under the Terminal-Per-Station plan using a Line IDF, it is possible to free most of the cable pairs of the partially loaded lines. This may be performed by transferring stations from a partially loaded party line to another partially loaded one to complete the so-called "Party Line Fill." Thus the Terminal-Per-Station plan eliminates the necessity of changing the telephone numbers and placing the vacated numbers on intercepting service. Immediate reconnection of another station to the same line is possible if a connector terminal is available. In addition to freeing a number of outside cable pairs and, incidentally, a number of line equipments as well, loading the cable pairs brings them in many cases up to 100% efficiency. Furthermore, the plan permits a subscriber to retain his telephone number when he moves to another locality in the same central office area.

Equalization of Originating Traffic Loads

SHOULD A condition arise where the telephone traffic originating from certain groups is constantly abnormal or overloaded (as determined by metering the traffic at the line equipment), it may be remedied by transferring lines from the overloaded groups of line equipment to the underloaded ones. In this way, an equalization of originating traffic can be maintained without any need for changing subscribers' numbers.

Without a Line IDF, this overloaded traffic condition could be corrected only by installing additional linefinders for the overloaded groups, and the same quantity of associated first selectors—redistributing the existing linefinders or altering line assignments.

A simple arrangement permits intercepting of calls to changed or

(*Please turn to page* 93)

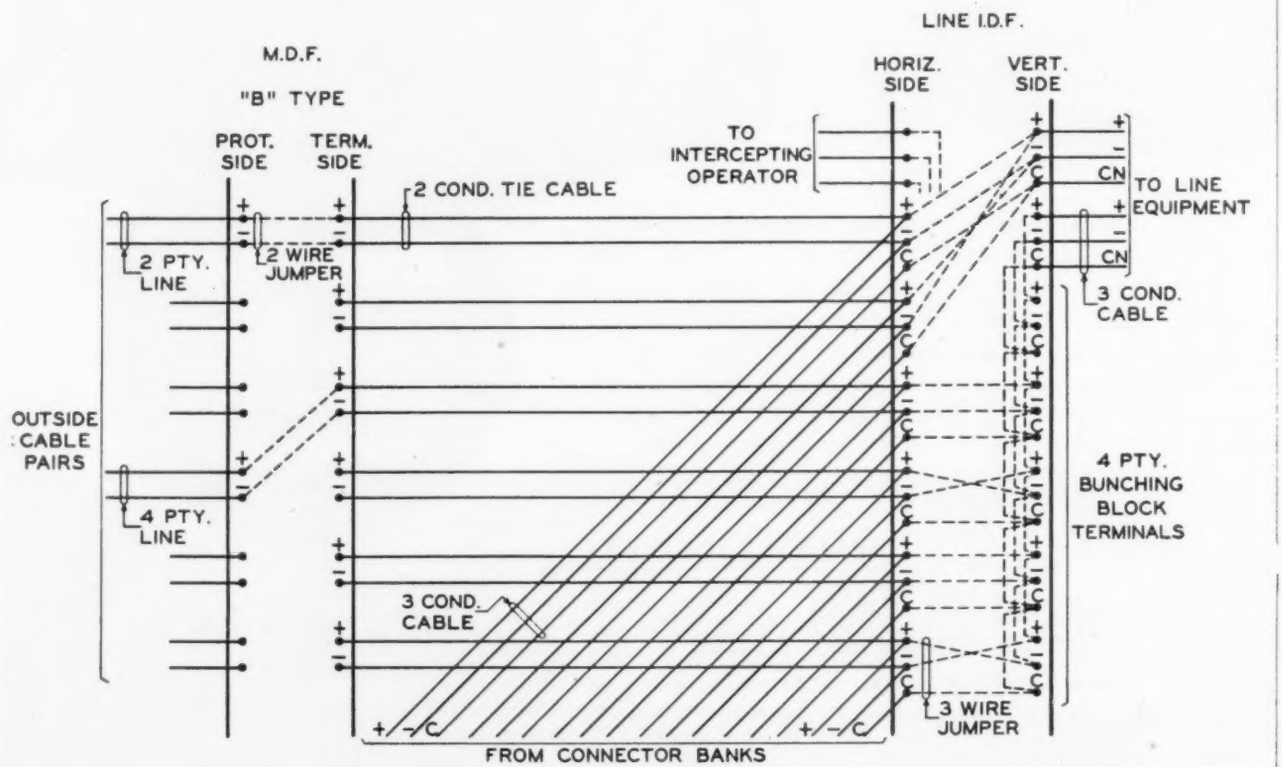

Fig. 7—Terminal-per-station plan; one and two code rings; connector bank cable multiple

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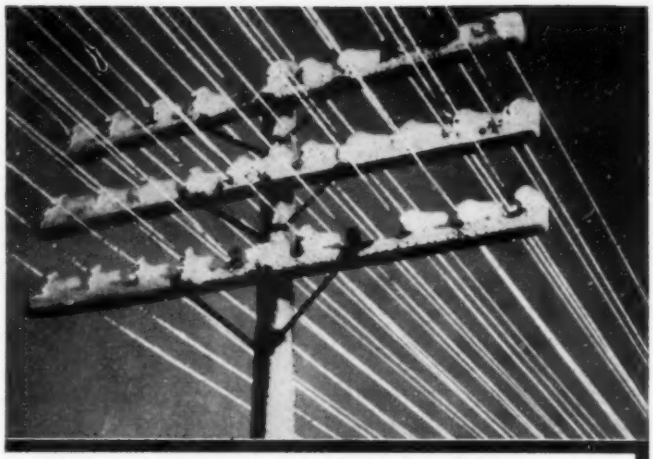

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A "New Look" For Rural Lines

(Continued from page 46)

the neutral wire of the power line. This arrangement effectively protects the telephone circuits in case of a cross with a power wire. The telephone circuits are transposed at every other pole with the transpositions on alternate circuits staggered, the latter to minimize crosstalk between the telephone lines. Each transposition is of the point type obtained by means of the two- insulator bracket arrangement shown in *Figure* 6. No tie wires are required to hold the wires in place on the insulators at this location.

To further reduce noise and shock from the power line induction, drainage units are employed as shown in *Figure* 7. These units are located every 2½ miles in the telephone circuits.

Another requirement that should not be overlooked is the use of electrically balanced central office equipment and of telephone sets that are not connected to ground in any way. If ground ringing is utilized, it is necessary to have a cold-cathode tube in the ringer circuit to ground to isolate th ringer and its connection to the line from ground.

Use of Telephone Carrier Via Power Lines

IN CERTAIN sparsely settled communities, where the development of rural power service to isolated customers has been extensive so that practically every potential telephone subscriber has access to this service, it is possible to make use of the same power lines to bring telephone service to the power customers.

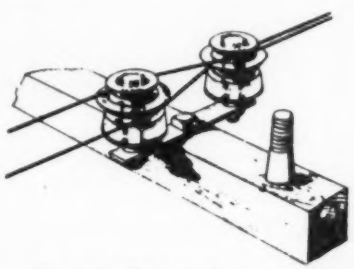

Fig. 6—Special two-point transposition arrangement.

As the result of research and tests over a period of several years in widely scattered communities, the Bell System has developed reliable carrier equipment that can be used on a single phase, multi-grounded neutral primary distribution lines operating at 7,200 volts. This equipment consists of a high voltage coupling capacitor and fuse, a pole-mounted coupling unit, and a carrier terminal in the central office and on the subscriber's premises.

The proper connection of the carrier equipment to the power line is very important. The coupling capacitor is designed to withstand a surge voltage of more than ten times its maximum rating. In addition a one-ampere fuse is inserted between the capacitor and the "hot" wire

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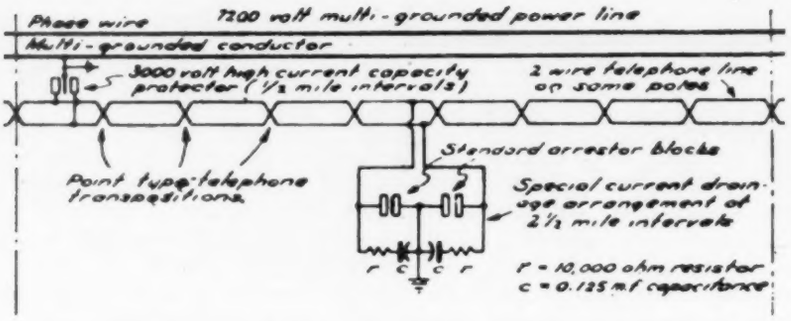
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r = 10,000 ohm resistor
c = 0.125 m.f. capacitance

Fig. 7—Transposition schematic of rural lines carried jointly with a high-voltage line, showing components of drainage unit.

to protect against the possibilty of breakdown of the capacitor.

In the coupling unit, additional protection for the carrier filters is obtained by protector blocks across the input carrier leads. A grounding switch enables the maintenance man to removes these blocks as necessary for cleaning or replacement without fear of receiving a shock. The first filter unit in conjunction with the high voltage capacitor effectively blocks the passage of the power line current into the carrier.

The coupling unit also has a transmitting and a receiving carrier filter. The receiving filter is connected to the line at all times and the transmitting filter is cut in only when the subscriber lifts his handpiece from the handset cradle. A relay in the coupling unit connects the transmitting filter.

In order to protect the maintenance man from possible contact with the high voltage line, the coupling unit is located a minimum of 40 inches below the lowest power attachment on the pole as prescribed by the National Electrical Safety Code.

To confine the carrier within the section of the power system assigned to the superimposed carrier and avoid

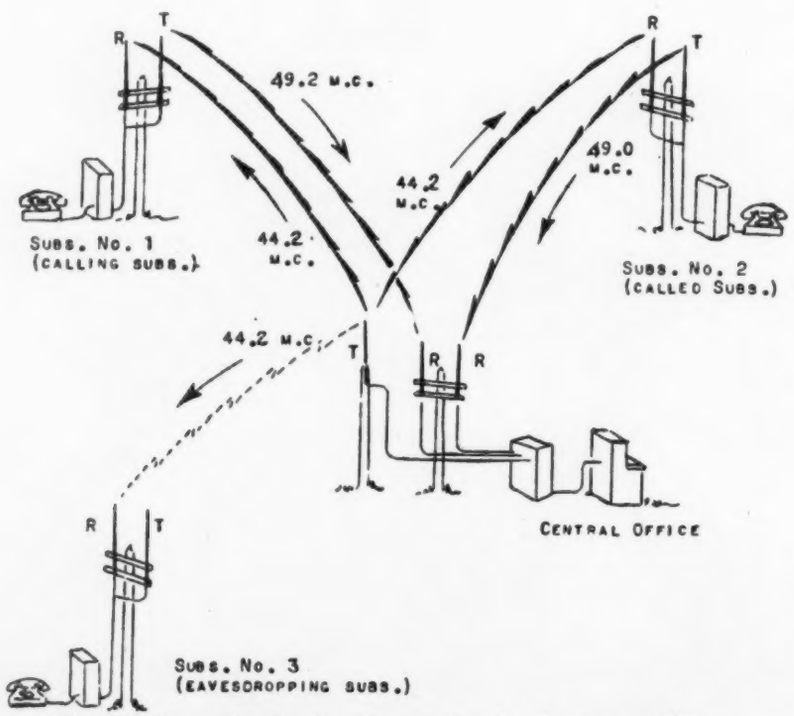

Fig. 8—Schematic showing how rural subscribers are linked to central office by radiotelephone.

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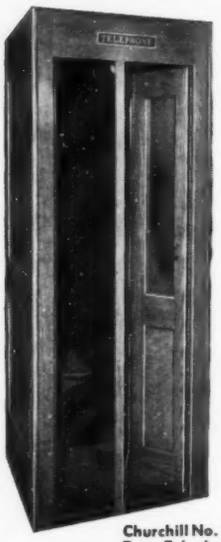

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losses at power line taps, blocking chokes are inserted in the tap lines on which the carrier is not to be superimposed. Special chokes of lower inductance are used in power line taps when it is desired to allow the carrier to travel over these branches. Proper terminations are made at the ends of the main line and the taps to produce the characteristic impedance of the line, which is important to prevent reflection losses.

The carrier equipment produces six amplitude-modulated carrier channels in a band between 150 and 455 kilocycles. Each channel employs three frequencies, one for the outgoing carrier from central office and the remaining two for the carrier from the subscriber to central office. One of the subscriber's carriers is utilized for office calls and the other for calling a subscriber on the same line.

The receiving circuit in the subscriber's carrier terminal consists of a tuned radio frequency amplifier with automatic gain control to compensate for fairly wide variations in line losses. The amplified carrier is demodulated by a varistor following the amplifier. The audio component of the carrier passes to the handpiece receiver. The d-c component is utilized to operate the ringing relay and the crystal switching relay.

The transmitting circuit consists of an oscillator-modulator followed by a power amplifier. This is a so-called electron-coupled oscillator with the audio modulation from the handpiece transmitter appearing on the injector grid. The oscillator portion of this circuit is controlled by one of two crystals of slightly different frequencies selected by the crystal switching relay according to whether there is a carrier adready present on the power line of not.

Modulation of the outgoing carrier by dial pulses is accomplished by having the impulse springs of the dial open and close the plate voltage supply to the plate of the oscillator-modulator tube.

At the central office, a carrier terminal is provided for each carrier channel. All these terminals are connected together with a common carrier lead to a common coupling unit on the pole at the entrance point. As in the case of the subscriber's equipment, a high-voltage capacitor and fuse connect one side of the common lead from the coupling unit to the "hot" side of the high-voltage power line. The rest of the carrier equipment performs the necessary

(*Please turn to page* 98)

Washington Bureau Reports

(Concluded from page 34)

mand. Naturally, workers with considerable seniority, particularly skilled plant men, would have much larger hourly increases on the 35-hour workweek system.

In addition, the AUTW also is seeking the so-called New York City workweek, under which Saturday work would be paid for at time and a half and Sunday work would be performed at double time, whether or not it came under the 35-hour figure. Since the telephone toll facilities can hardly be shut down on weekends as can many establishments, the AUTW proposal taken at face value would result in a tremendous boost in Long Lines payrolls.

Mobile, FCC Representatives Take Stand

BY THE TIME this issue of TELEPHONE ENGINEER & MANAGEMENT comes off the press, the House Interstate and Foreign Commerce Committee will have heard a substantial number of persons interested in the development of mobile radiotelephone vigorously opposing the Lemke resolution to force the FCC to put FM broadcasting back in the 44-50 megacycle band.

The situation is of paramount interest to the safety and special services because an FCC proposed decision looks toward taking the 44-50 mc band away from television and assigning it to the mobile services. The FCC in its allocation orders of 1946 moved FM to the "upstairs" 88-108 mc band, and at that time made the 44-50 mc range television channel 1.

FCC Commissioner George E. Sterling is slated to be the leadoff witness in the hearings, and it was considered certain that he would present to the House group a forthright exposition of the FCC's careful and comprehensive work in the difficult problems of frequency allocation and fitting the many necessary services into the crowded spectrum.

In addition, it was expected that no punches would be pulled by the spokesman from the mobile radio services, particularly by the safety and emergency services.—THE END.

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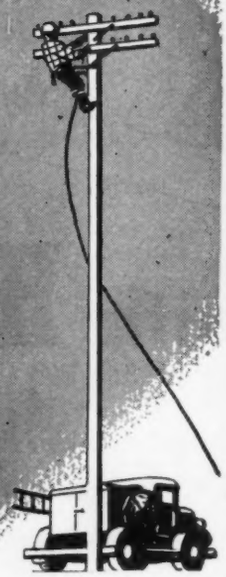
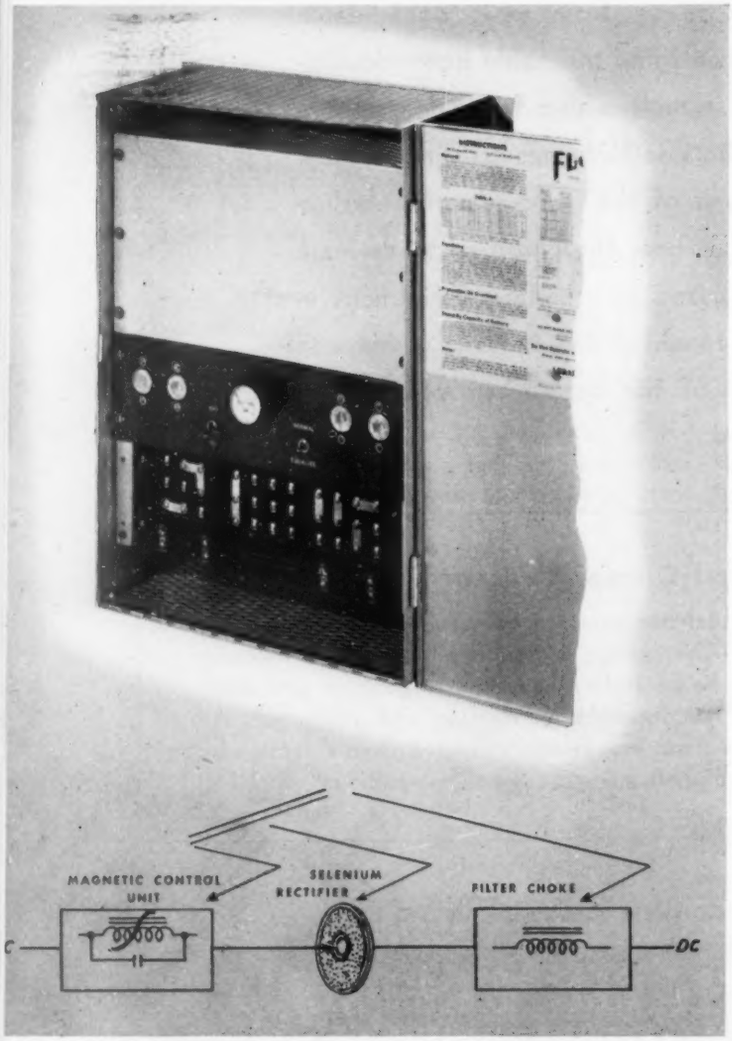


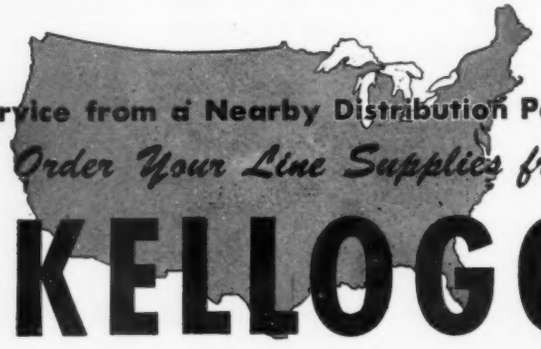


No Moving Parts to Wear! The Flotrol battery charger consists of a phase-splitting transformer and a dry-disc rectifier. Entirely automatic, it delivers correct trickle charge at constant voltage to battery. Compensates for input voltage variations and load-changes. For full details, write for LORAIN PRODUCTS CORPORATION Bulletin No. 137.

Sealed Against Trouble. Leading manufacturers of communication equipment rely on Kester Rosin-Core Solder to eliminate high-resistance joints and intermittent open-and-closed circuits. It permanently seals joints, protects them against service troubles. The special flux in this KESTER SOLDER COMPANY product will not cause corrosion.

There's three-way satisfaction when you concentrate purchases of line supply and construction materials at a single, responsible source: (1) The *quality* is right—all products are backed by the famous Kellogg DOUBLE GUARANTEE; (2) The service is right—orders are intelligently handled by experienced people; (3) *Delivery* is right—orders are shipped from the nearest of over 100 strategically located distribution points.

KELLOGG SWITCHBOARD & SUPPLY COMPANY
Branch Offices: Kansas City, San Francisco, St. Paul, Los Angeles
Factory and General Offices: 6650 S. Cicero Avenue, Chicago 38

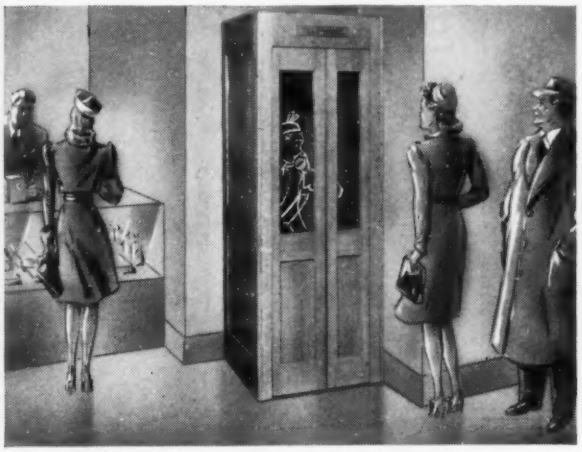


For Service from a Nearby Distribution Point

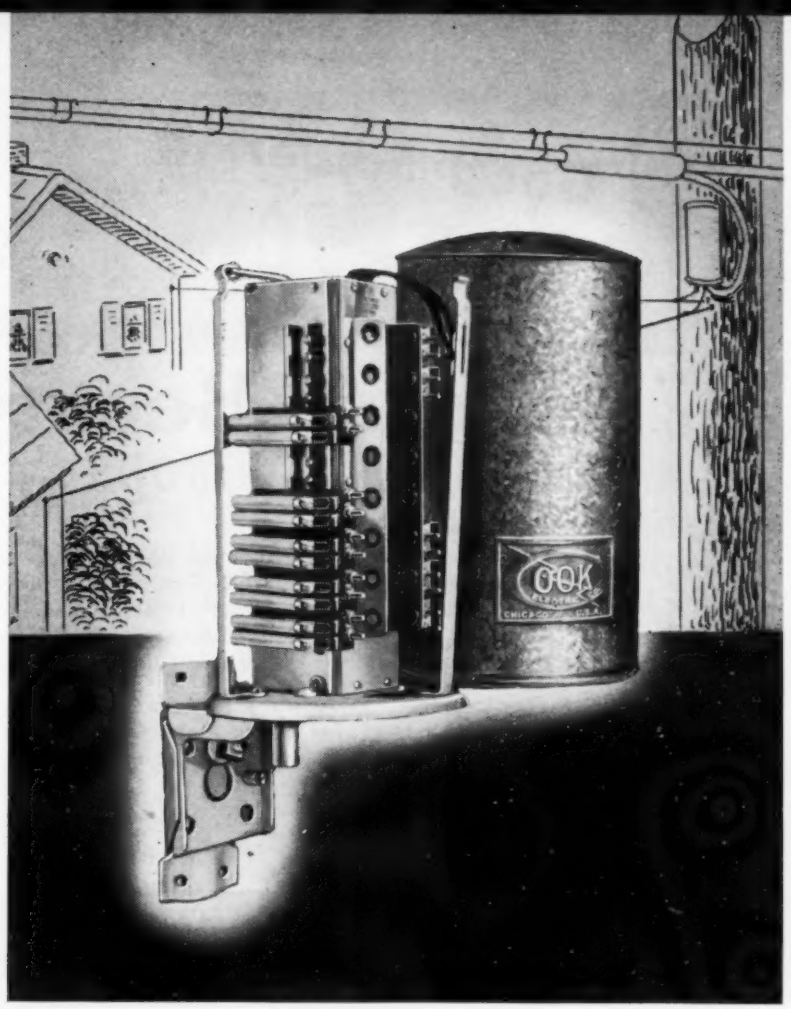
Order Your Line Supplies from

KELLOGG

Fits Telephone Needs to a "T". Ray-O-Vac Telephone Dry Batteries are built to resist deterioration when not in use. Their internal protective coating, developed by RAY-O-VAC COMPANY, extends their life, whether used or not. The result: Fewer battery replacements, and thus lower costs.

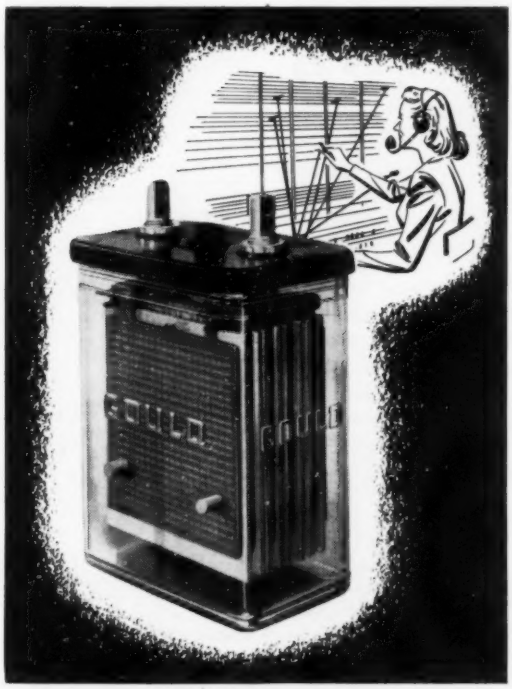


Increased Pay Station Revenue is easily accomplished when you give the public the privacy, roominess and comfort of CHURCHILL CABINET COMPANY'S Booths. Of the many styles available, the No. 100 Booth with acoustical designing, automatic light, and ventilator, is very popular.



Convenience, Accessibility and Economy, are the outstanding features of COOK ELECTRIC COMPANY'S S-20 Pole Cable Terminal and protector mounting. Drop connections, fuses and lightning dischargers are easily reached at the front; self-soldering nozzle lies close to pole. A strong guide holds the hood securely in raised position for working ease.

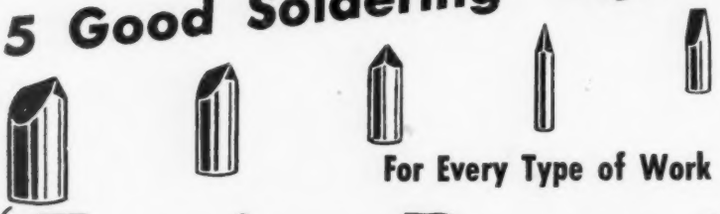
Lines that Last; yet Cost You Less! Copperweld line wire, made by COPPERWELD STEEL CO.'S Molten-Welding Process has the strength of steel plus the conductivity and rust-resistance of copper. Ideal for long-span work; safe under heavy wind and ice-loading.



Dependable Power is the cost-cutting benefit enjoyed by users of GOULD STORAGE BATTERY CORP. Planté Batteries. All surfaces of the ribbed, pure lead positive plates are covered with a dense film of active material. Retards peroxidation, insures longer life.

Long Life Expectancy is built into pressure-treated Southern Pine Poles and Crossarms. Carefully and thoroughly treated by AMERICAN CREOSOTE WORKS, INC., these poles have the extra durability required for dependable service under toughest climatic conditions.

5 Good Soldering "Tips"



For Every Type of Work

"American Beauty" SOLDERING IRONS

Five work-convenient sizes from the 50-watt featherweight to the 500-watt heavy-duty iron cover a wide range of uses. Insulation tested at 1100 volts to insure long, trouble-free service. Select the American Beauty you need from the Automatic Electric catalog.

American Beauty soldering irons with tips of commercially pure bar copper assure a steady, even flow of heat at the working point—tips for good soldering for every type of job.

Recommended and Distributed by

AUTOMATIC ELECTRIC SALES CORPORATION

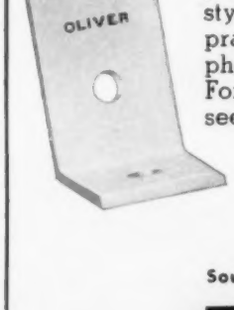
1033 WEST VAN BUREN STREET, CHICAGO 7, ILL.

OLIVER

TELEPHONE LINE

BRACKETS

FROM THE COMPLETE LINE OF OLIVER POLE LINE MATERIALS



You will find all types and sizes of brackets required for telephone work in the complete Oliver line. Some of the popular styles are illustrated. Various types suit the practices and requirements of leading telephone, telegraph and railroad companies. For full details see Catalog 43.

OLIVER IRON AND STEEL CORPORATION

South Tenth and Muriel Streets · Pittsburgh 3, Pa.

MAKERS OF POLE LINE MATERIALS SINCE 1894

Rate Adjustment Approved For Fountain, Minn.

The Minnesota Railroad & Warehouse Commission found proposed rate adjustment requested by the Fountain (Minn.) Telephone Company unreasonable for the limited number of subscribers served, and prescribed rates that in the commission's opinion are fair and reasonable.

The present and proposed rates, and the rates prescribed are as follows:

Class of Service I	Present Net Rates II	Proposed Gross Rates III	Prescribed Gross Rates IV
Individual Line Business	$2.00	$5.25 (a)	$4.25 (a)
Two-party Line Business	.....	4.75 (a)	3.75 (a)
Extension Stations —Business	.....	1.00 Net	1.00 Net
Individual Line Residence	1.50	3.75 (a)	2.50 (a)
Two-party Line Residence	.....	3.25 (a)	2.25 (a)
Four-party Line Residence	.....	2.75 (a)	2.00 (a)
Extension Stations —Residence	.....	1.00 Net	.75 Net
Rural Multi-party Line Switching	.40	.90 (b)	.75 (b)
Semi-public Pay Station	.....	3.00 (a)	3.00 (a)

(a) A discount of 25 cents to be allowed on all gross rates if paid in advance before the 15th day of each month.

(b) A discount of 15 cents per month to be allowed on Rural Multi-party Switching charges.

◆

A.T.&T. Files Television Network Rates

Rates for television network facilities, to become effective May 1, have been filed by the American Telephone & Telegraph Company with the Federal Communicatins Commission, according to an announcement by Bartlett T. Miller, vice president in charge of the company's Long Lines Department. With the establishment of rates, the growing network of Bell System television channels will be placed on a commercial basis.

At present, television facilities are being furnished by the A.T.&T. company without charge to broadcasters over a combined coaxial cable and radio relay network between Boston, New York, Philadelphia, Baltimore and Washington.

Under the proposed rates, a television or "video" channel between two cities will cost the broadcaster $35 a month per airline mile for eight consecutive hours each day, and $2 a month per mile for each additional consecutive hour. For occasional or part-time service the rate will be $1 per airline mile for the first hour of use and one-quarter of that amount for each additional consecutive 15 minutes.

For the use of terminal equipment and its maintenance, there is a charge of $500 a month for connecting stations to the television network for eight consecutive hours daily. For

stations which require only occasional service, the charge will be $200 per month plus $10 per hour of use.

Rates now in effect for sound or "audio" broadcasting will apply for the separate sound channel needed for the complete television program.

◆

Motley, Minn., Exchange Granted Rate Increase

Motley Telephone Exchange operating a telephone exchange in the village of Motley, Minnesota, serving approximately 42 local stations and switching for 72 service stations, has received authority to make the following rate revisions:

Class of Service	Present Net Rates	Approved Gross Rates
Individual Line Bus.	$2.50	$3.75 (a)
Two-party Line Bus.	—	3.25 (a)
Individual Line Res.	1.50	2.50 (a)
Four-party Line Res.	—	2.00 (a)
Extension Stations, Bus.	1.00	1.00 Net
Extension Stations, Res.	—	.75 Net
Extension Bells	—	.25 Net
Gong Type Bells	—	.50 Net
Service Station Switching	.35	.75 Net

(a) All gross rates to be billed monthly in advance with a discount of 25 cents to be allowed if paid on or before the 20th day of the month in which service is rendered.

◆

Northeastern Iowa Group Meets in Postville

Eighty enthusiastic telephone men and women from 23 different companies in Northeastern Iowa met at Postville on February 26.

C. C. Pearce, president of the Northeastern Iowa Group opened the meeting with a short discussion regarding the necessity of obtaining adequate rates. He stressed the fact that the telephone represents only a small item of family expense, and that though it may cost a farmer $2.50 where a few years ago it was half of that, it is still the greatest bargain in the family budget.

R. B. Nelson, district manager of the Northwestern Bell Telephone Company gave an informative talk on the extra income to be derived from sales of directory advertising. Mr. Nelson went into detail as to the various types of ads sold, how to sell the space, and the rates to be charged.

Much interest was shown in the new Midget Coffing Hoist and the Weller Soldering Iron which were on display. Those in attendance gathered advance information regarding the new real high strength wire now being tested in the laboratories. This new wire is supposed to have a breaking strength of near 1800 pounds, which will permit spans upwards to 500 feet.

L. Deveny gave a practical talk on construction practices now being used by the Bell company in building rural

KLEIN
TOOL BELTS

"KLEIN-LINE" BELT
New design with "Klein Kord" Sliding Trace that allows movement of approximately 6 inches in either direction. Reduces chafing and safety strap wear. Comfortable latigo leather cushion. All sizes.

"KLEIN-KORD" BELT
Made of "Klein-Kord," the material made famous by Klein Red Center Safety Straps. Wide, comfortable fabric cushion. All sizes.

★ To the lineman a fine tool belt is more than a necessity—it is a proud possession that assures safety, comfort and convenience—is essential to efficient work.

Klein Tool Belts—favorites among linemen—are made in a range of styles and sizes to suit individual preferences and requirements. Advantages of Klein Belts include tested "Dee" rings drop forged from the finest steel . . . hand-set rivets of solid copper . . . lock stitched sewing with hot waxed thread . . . convenient tool loops . . . plier pocket, tape thong and knife snap.

Illustrated here are two recent additions to the complete line of quality Klein Tool Belts—the "KLEIN-LINE" Belt with the sliding trace and the "KLEIN-KORD" Belt made of multiple plies of long staple cotton vulcanized in rubber.

To assure the last word in comfort, convenience and safety be sure to specify Klein Tool Belts.

Ask Your Supplier
Foreign Distributor: International Standard Electric Corp., New York

A copy of the Klein Pocket Tool Guide, showing the Klein line and containing valuable tool information, will be sent on request.

KLEIN TOOLS EST. 1857 TRADE-MARK REG.
Since 1857

Mathias Klein & Sons
Established 1857 — Chicago, Ill., U.S.A.
3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

AUTELCO-GRAY PAYSTATIONS

Rescue Lost Revenue

The Type 62, shown above, provides central-battery prepay service with any central office equipment, either automatic or manual, having 110-volt coin-control facilities. It is one of the many available types of Autelco-Gray Paystations which include assemblies to meet every requirement of paystation service.

Get Extra Operating Income with Modern "60" Series Paystations

Wherever you install Autelco-Gray Paystations you are assured of continuous revenue that otherwise is lost when a prospective user "borrows" a private telephone.

Guard against this loss of operating income by installing modern Autelco-Gray Paystations. Every drug store, bus station, gas station, restaurant — every place where people meet—provides an extra source of telephone-user income. Autelco-Gray Paystations pay for themselves in the extra income they produce, and they continue to produce for many years after their initial cost has been absorbed. Ask for details on the complete Autelco-Gray line.

AUTOMATIC ELECTRIC

Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . . . Machine Switching Automatic Dial Systems
Makers of Telephone, Signaling and Communication Apparatus . . . Electrical Engineers, Designers and Consultants

Distributors in U. S. and Possessions

AUTOMATIC ELECTRIC SALES CORPORATION, 1033 W. Van Buren St., Chicago 7, U. S. A.
Export Distributors: INTERNATIONAL AUTOMATIC ELECTRIC CORPORATION

AUTHORIZED AGENTS FOR AUTELCO-GRAY PAYSTATIONS

Automatic Electric Sales Corporation . . . Graybar Electric Company . . . Kellogg Switchboard & Supply Company . . . Leich Sales Corporation . . . The North Electric Mfg. Company . . . Stromberg-Carlson Company.

lines today. He discussed classes of poles, size of brackets, type of insulators, depth to set poles, guying, anchors, wire sleeves, etc. This portion of the meeting was conducted very informally and interest was indicated by the many questions asked.

A. C. Ruble of the Iowa State Tax Department and Bill Miller, secretary of the Iowa Independent Telephone Association were on hand, each offering some timely comments on activities relative to their offices.

M. Bowlsby, traffic manager from Waterloo, conducted an operator's meeting. Among important points brought out was the fact that completed messages are the only thing that telephone companies have to sell and the responsibility of completing such messages rests with each and every operator.

◆

Telephone Company Goes Easy On Coin Box Thief

William Ross, New York City, who has spent nearly half his life in jail for rifling telephone coin boxes, won't have to spend the rest of it there. The telephone company interceded for him.

Ross, arrested 10 times for coin-box pilfering in the last 27 years, got out of the penitentiary last year. Two months ago, back at work on another telephone box, he was arrested again and charged with burglary and possession of burglars tools. Conviction on those charges would have sent him back to jail, this time for life under the state's fourth-time felony law.

His head bowed, Ross appeared in court. He wept when Judge Harry Stackell permitted him to plead guilty to third degree burglarly, a misdemeanor.

The telephone company, the judge told the prisoner, requested the lesser plea because it had no wish to see Ross behind bars for the rest of his life.

The judge gave him a year in the penitentiary instead.

◆

Terminal-Per-Station Plan

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(*Concluded from page* 80)

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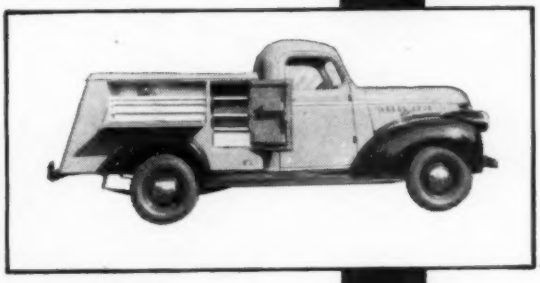
unassigned connector numbers. The connector bank terminals of these numbers are strapped in one of several ways to an intercepting terminal. A number of these termi-

It takes DEPENDABLE SERVICE to keep customers . . .



that's why YORK-HOOVER BODIES are re-ordered again and again

Specific purpose design — dependable service — low maintenance service—that's what operators are getting from YORK-HOOVER BODIES. And so the number of York-Hoover repeat customers is constantly growing.

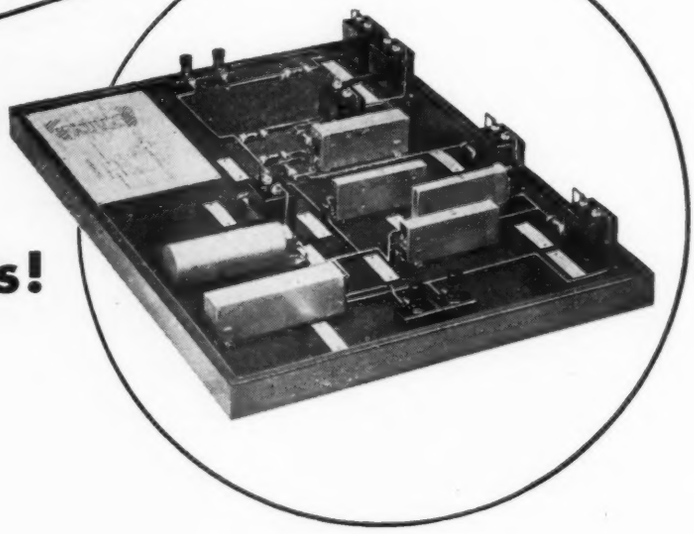
To meet this healthy, steadily growing demand, York-Hoover has increased plant and production facilities so that we hope to say "prompt deliveries" in the not too distant future.

YORK-HOOVER BODY DIVISION CORPORATION

YORK, PENNSYLVANIA

This is your telephone receiver

...and believe it or not...



so is this!

They look nothing whatever alike—they're composed of entirely different elements—but to the design engineer, they're identical twins!

The resistors, capacitors and coils on the board form what is known as an "equivalent circuit." This provides an *all-electrical* means of determining, before the first model is built, how the electrical *and mechanical* elements will react in a receiver.

The use of "equivalent circuits"—pioneered by Bell Telephone engineers some 25 years ago—has proved of great value in developing better communications equipment of many kinds. They cut development time and costs—for the effects of changes in the design of *mechanical* elements can be very quickly and inexpensively foretold by simple changes in the electrical components of the "equivalent circuit."

Add to such continuing scientific development studies at Bell Telephone Laboratories, the highly precise manufacturing methods of Western Electric—and you get the world's finest telephone equipment.

Will 1/1000th inch greater or less diaphragm thickness improve the performance of a telephone receiver? Slight changes in this "equivalent circuit" provide the answer quickly and economically.

Western Electric

TELEPHONE APPARATUS AND CABLE

nals are multiplied to form one, two or more groups, each of which is jumpered to an intercepting block located usually on the same side of the Line IDF as the connector bank blocks. From the intercepting block, trunks are cabled either directly to the operator's position, or indirectly via a small group of relays. In the case of a busy condition on an intercepted call when no relay groups are used, a busy tone would be heard by the calling subscriber. When the intercepting relay groups are used, however, a ring-back tone would be heard, giving the calling subscriber the impression that the called subscriber was being signaled, when in reality it was the intercepting operator. A number of accumulated calls can thus be handled and released by the operator as long as the calling subscriber remains on the line. There is no need for intricate and costly intercepting equipment in this arrangement, a feature of the Terminal-Per-Station plan which is of considerable importance.

There are periods of time when most operating companies can anticipate a large number of requests for an upgrading of service. For instance, four-party line subscribers will ask for two-party line service, while two-party line subscribers will want individual line service. At other times, there will be requests for downgrading.

Simultaneous changes of this nature would have a bad effect on telephone service if such conversions could not be made readily without changing subscribers' numbers, as is necessary when a Terminal-Per-Station plan is not employed. Since a Line IDF is used, the Terminal-Per-Station plan facilitates any change in grade of service. Retention of telephone numbers, desirable when requests call for upgrading of service, is easily achieved. In addition, a more effective grouping of party lines is permitted as required, offsetting in many cases the need for additional equipment or the conversion of single line equipment for party line service.

Consideration of Alternative Features

IN SUMMARIZING the relative merits of alternatives available under the Terminal-Per-Station plan described above, a comparison should be made between:

(1) Ringing schemes (one-ring and two-ring code vs. multi-frequency harmonic ring).

(2) Trunking arrangements (line

Up in the air...

You work with Comfort, Safety & Confidence in a

Buckingham

INDUSTRIAL SAFETY SEAT

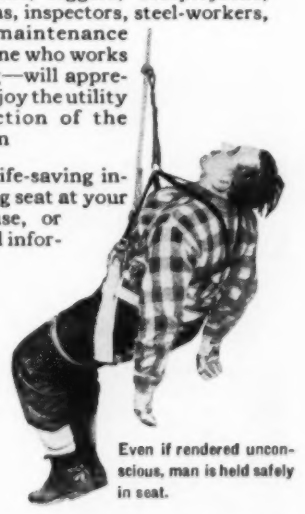
Greater freedom of movement . . . added comfort . . . and sure protection against falling from the seat, whether conscious or not—rigging workers have all these advantages in the BUCKINGHAM Safety Suspension Seat.

The picture shows how the load is carried by the heavy wrought iron hook. The rigid wood seat, which cannot become dislodged while in use, provides more comfortable support for the worker, preventing the binding and constriction encountered in rope or strap slings. Leg straps keep the 5¾" seat always in proper position.

Use of the chest harness makes it impossible for the man to topple from this suspension seat, either from vigorous movement, or from loss of control through sudden illness, accident, sunstroke, gas fumes. The safety cord, fastening to the carrying rope or cable above the worker's head, keeps the user's body approximately in normal position in event of emergency . . . yet does not interfere with customary activity.

Electricians, riggers, steeplejacks, tree surgeons, inspectors, steel-workers, painters, maintenance men—anyone who works from a sling—will appreciate and enjoy the utility and protection of the Buckingham

See this life-saving industrial sling seat at your supply house, or write for full information.



Even if rendered unconscious, man is held safely in seat.

BUCKINGHAM MANFACTURING CO., INC.

Binghamton, N. Y.

Standard Products of Standard Manufacturers

Listed are representative items out of the complete line of construction and maintenance supplies that we can furnish promptly.

Bolts, Carriage ⅜" x 3½"	$ 3.11 C
Bolts, Cross Arm ⅝" x 8"	15.04 C
Bolts, Thimbleye Strt. ⅝" x 10"	37.04 C
Bolts, Thimbleye Angle ⅝" x 10"	40.05 C
Brackets, Corner, Small	16.15 C
Brackets, House, Std	8.59 C
Brackets, Pole 7/16" Hole	13.06 C
Brackets, Wood Pole	9.73 C
Clamps, Drop Wire Type P	8.50 C
Clamps, Snub R Grip, Steel	14.65 C
Clamps, Guy, 2 Bolt Med	20.94 C
Clips, Drop Wire, Kearney	8.05 C
Connectors, C. R. #3, Tinned	12.00 C
Hooks, Drive	8.03 C
Insulators, Glass #9	5.61 C
Screws, Lag ½" x 3"	4.25 C
Steps, Pole ⅝" x 10"	15.04 C
Dry Spot, Kearney Rods, Anchor, oval eye ½" x 6"	65.74 C
Rods, Anchor, thimbleye ½" x 6"	72.22 C
Rods, Ground, Gal. with tails	62.64 C

SINCE 1926

TELEPHONE REPAIR & SUPPLY COMPANY

DAN'L H. McNULTY, President and Manager

1760 Lunt Avenue — Chicago 26, Illinois

THERE'S A *Runzel* RECEIVER CORD FOR EVERY TYPE RECEIVER

Whatever your receiver equipment—from the old style wall type to the most modern dial desk type—there's a Runzel receiver cord that will do a better, longer-lasting job. Runzel receiver cords are offered in a choice of colors, black or brown. Special length cords can be speedily made to order.

You can rely on Runzel cords for your receiver, switchboard, desk stand, operator and hand set needs.

It's simple to order Runzel cords —by Runzel code, original manufacturer's code, or by sample cord.

RUNZEL CORD & WIRE CO.
4723-31 MONTROSE AVENUE • CHICAGO 41

cable multiple, as in Figure 6, vs. connector bank cable multiple, as in Figure 7).

Not much choice exists between ringing schemes. Code ringing necessiates both fully selective and semi-selective ringing signals, while harmonic ringing offers fully selective signals for all party line stations. However, the machine for code ringing requires but one generated frequency, whereas four frequencies are needed for harmonic ringing. Connector switches are similar in structure and quantities required under either scheme are the same.

Choice of trunking arrangement is largely a matter of telephone company preference. Where the line cable multiple is carried to the MDF (Figure 6), traffic redistribution is effected by changing jumpers at both MDF and Line IDF. Where the connector bank multiple is carried to the MDF and, as a rule, permanently cross-connected to the outside cable pairs (Figure 7), traffic redistribution is accomplished by changing jumpers at the Line IDF only. The additional quantities of cable and blocks required in the scheme shown in Figure 7 should be considered of small importance.

Contemplating using the Terminal-Per-Station plan requires discussion of many variable factors, chief of which concerns the local conditions which must be accomodated within each particular telephone plant under consideration. There may or may not be, for example, a large demand for party line service. Planning must take into account the available floor space, the outside cable plant, the expected growth of the exchange, and the types of service to be rendered. The requirements of each particular case will best be determined after collating all information. As this article has pointed out, the advantages inherent in the Terminal-Per-Station plan for providing party line service make it worthy of serious consideration for adoption in any automatic telephone project, and become particularly important in exchanges ranging upward from about 1000 lines.—THE END

◆

M. W. Ruthven Joins Capital City Tel. Co.

Malcom W. Ruthven, former chief clerk to the Missouri Secretary Of State, has joined the Capitol City Telephone Company, Jefferson City, Missouri, as general commercial manager.

Modern Aerial Cable Construction

(Concluded from page 42)

THE DOWN GUY is fastened to the eye bolt as well as to the anchor rod by means of heavy three-bolt clamps. If the down guy is 10,000 lbs in strength one three-bolt is used at each point. If the guy is heavier two or more three-bolts are employed. The first three-bolt clamp is placed approximately two inches from the end of the eye bolt or anchor rod. Additional clamps are attached close to the first one. A short stub of strand is left at each attachment and the end of this stub is lashed to the strand by means of either soft .109 wire or, preferably, serve-up clips.

At the upper attachment this stub should be approximately seven inches in length; at the lower attachment (at the guy rod) it should be about twelve inches. A longer stub is left at the bottom since it may be required at some later date for attaching a grip if it is necessary to pull slack in the guy. This rule is usually followed in all types of guying: if the attachment is one that may require the use of a grip for pulling slack, a twelve inch stub is left; if it is one where no such requirement is likely, a seven inch stub is left.

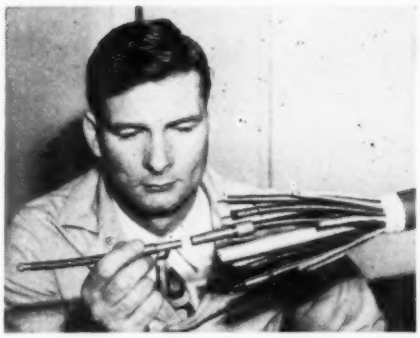
Many companies follow the practice of placing a strain insulator in all cable down guys, especially in those on poles used jointly with power companies. The strain insulator should be so located that when the guy is permanently in place the insulator will be from eight to ten feet from the ground. In this way there will be no possibility that a person standing on the ground could reach the guy wire above the insulator. The insulator is secured by means of heavy three-bolt clamps —one clamp for 10,000 lb or smaller strand, and two clamps for 16,000 lb strand. The serve-up stubs should be approximately seven inches in length.

Side guys and anchors for aerial cable can be selected and installed much the same as dead end anchorages. On corners which are not sharp and do not offer too much strain, guying the requirements may be lessened somewhat. However, it is always economy for an anchorage to be too strong rather than too weak. If the supporting strand for the cable is to be on the same side of the pole as the side wire, the guy is attached to the pole about four inches above the strand by means of an angle eye bolt, strain plate, curved washer and regular nut. If the supporting strand for the cable is on the opposite side of the pole from the side guy, the guy is placed at the same level as the supporting strand, and the opposite end of the eye bolt is used for the attachment of the strand.

All down guys which have any likelihood of offering a hazard to the public or to animals should be protected with guy guards. Any standard guard, available from all suppliers, will be satisfactory. The lower end of the guard should be at the ground line and fastened to the anchor rod; the upper end should be attached to the down guy. In rural areas a guard made from an old ten-pin crossarm, securely attached with .109 wire, is often sufficient.

ALL AERIAL CABLE poles which are frequently climbed, and most certainly all terminal poles, should be stepped. Not only does the stepping save considerable time in climbing, but it also protects the poles from the gouging and puncturing of innumerable lineman's spurs and thus adds years to their life. Steps are placed in line with the lead whenever possible.

In stepping terminal poles a wood butt step is placed three and a half feet above the ground line, in line with the lead, on the office side of the pole. Two iron steps, one directly opposite the other, are driven home three feet above the wood step. A second set of two iron steps, one directly opposite the other, is placed



A flexible emergency cord designed to by-pass breaks in coaxial cable and thus facilitate repair operations has been developed by Bell Telephone Laboratories. The cord is light and easily handled and is expected to minimize interruptions of these circuits.

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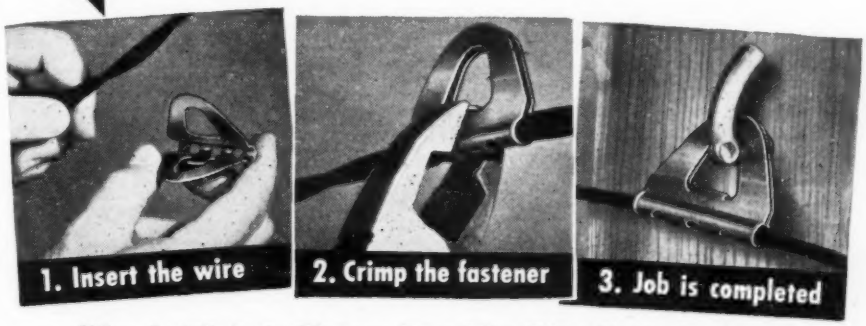

When installed, the Kearney Drop Wire Clip will stay in place. The wire is completely enclosed so that it cannot fall from the clip. It avoids spot loading, too, because it grips the wire over the entire length of the clip.

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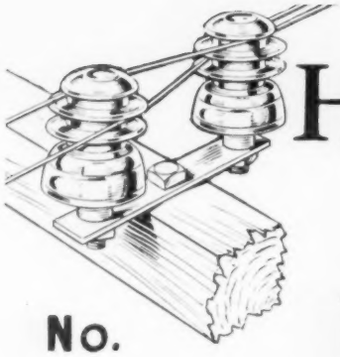

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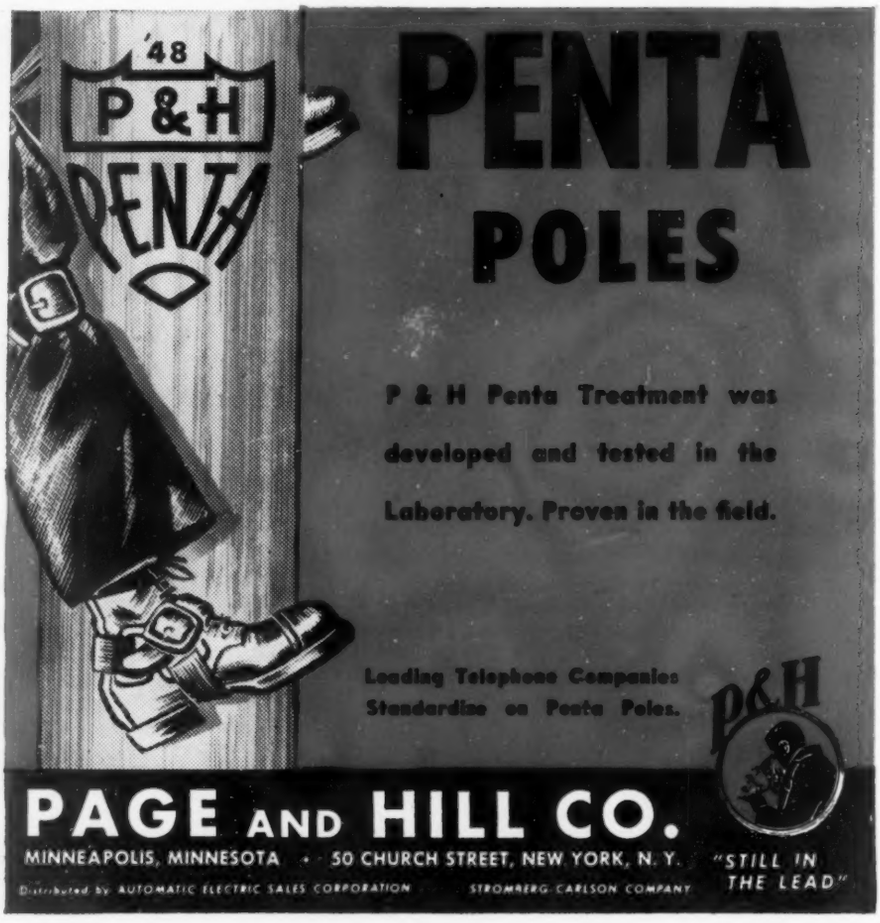
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three and a half feet below the terminal. The distance between the two sets of double steps is then divided into spaces as near to eighteen inches as possible, and one iron step is placed at each division on alternate sides of the pole.

One iron step is placed eighteen inches above the top set of double steps. A special iron step with a long hook head is installed on the side of the pole directly opposite from the terminal, and even with the bottom of it. Iron pole steps should be $\frac{5}{8}$" by 9" when used in hard wood poles, and $\frac{5}{8}$" by 10" when used in soft wood poles.

The iron steps should be driven into the pole until there is about five and a half inches of space between the head of the step and the pole. A certain amount of care should be given the placement of the steps so that they line up reasonably straight and are as nearly level as possible. When steps are installed without this care they present an unsightly appearance and much of their utility is lost.

In this first part of a series on aerial cable construction, we have discussed the length of poles and of spans, the location of poles, the employment of extension arms, joint use of poles, anchor specifications, specifications of down guys for cable dead ends, methods of attaching down guys to the pole and to the anchor rod, the use of strain insulators, side guys and anchors, guy guards, and a suggested method for stepping poles. All of these elements are important considerations in the building of a pole line which will have maximum reliability.

The next aspect of aerial cable construction to consider is placing of the suspension strand. This subject will be discussed in the next issue. (*To be continued in your May issue of* TELEPHONE ENGINEER AND MANAGEMENT.)

◆

A "New Look" For Rural Lines

•

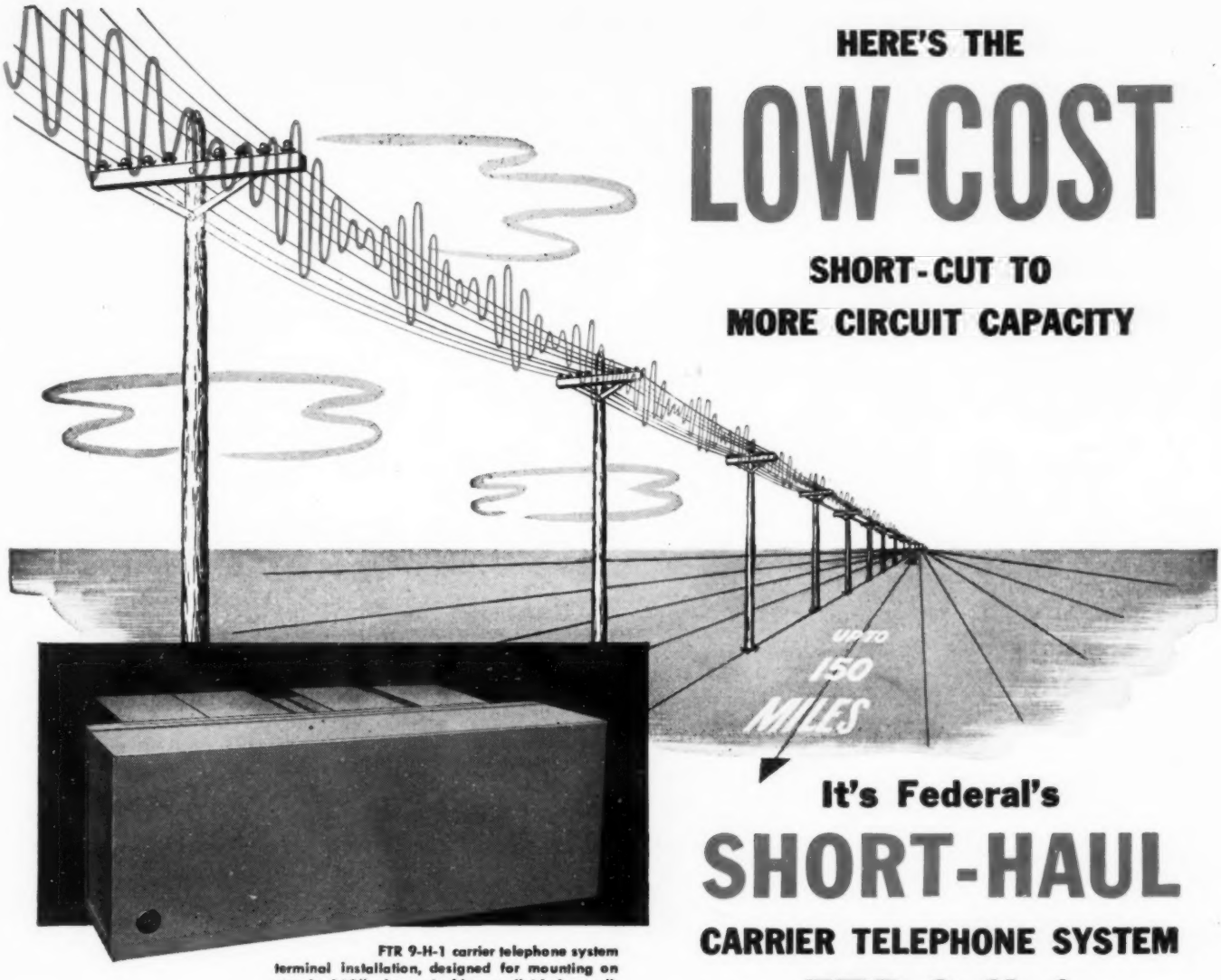
(*Continued from page* 86)

•

functions of converting the outgoing ringing signals and speech to modulated frequencies and the incoming carrier frequencies to direct current pulses for operating the central office switching equipment and to speech for transmission to called subscribers.

The subscriber makes and receives calls in the same manner as other

(*Please turn to page* 100)



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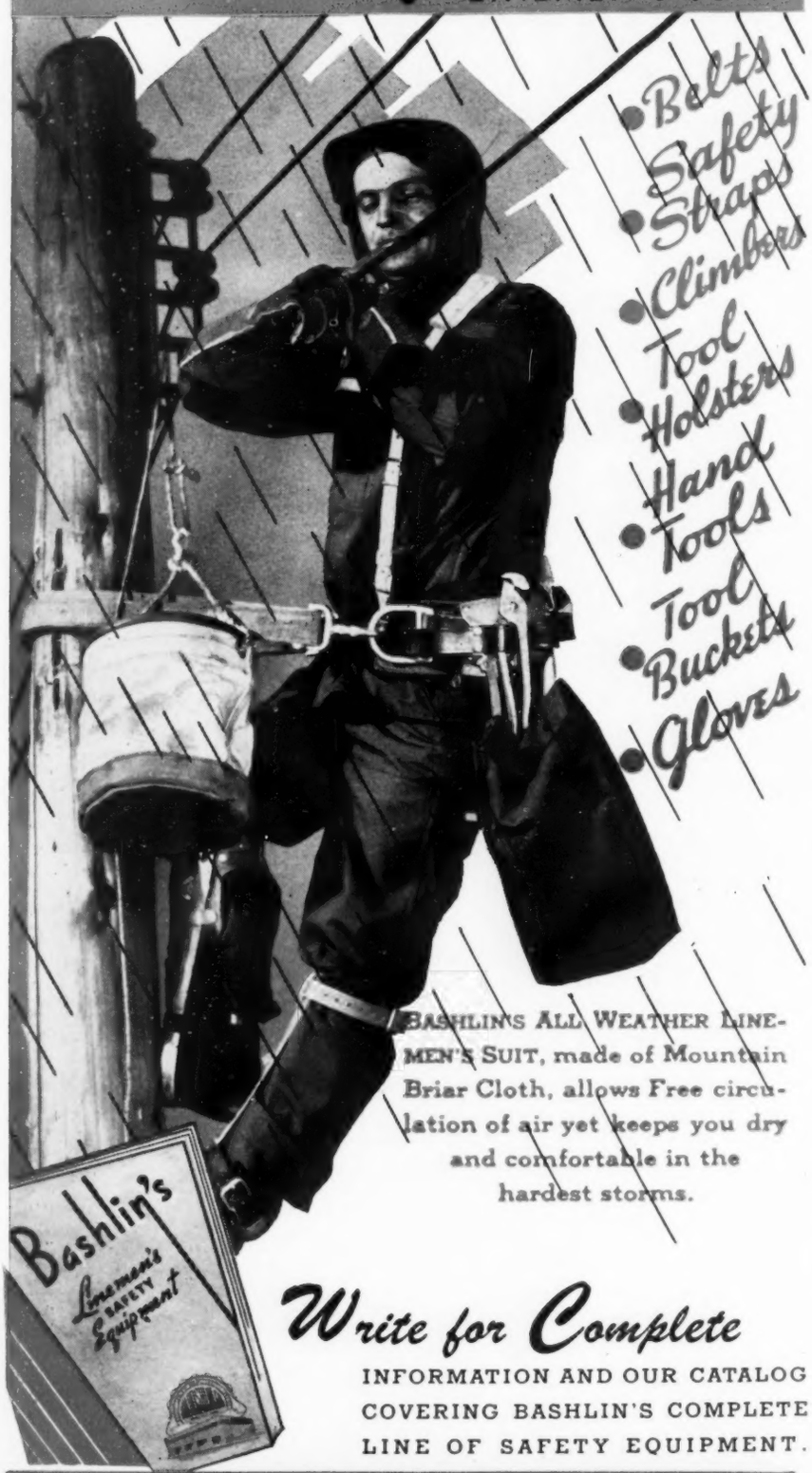

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subscribers in the telephone exchange served by cable or wire lines. The one exception is when he desires to call another subscriber on the same carrier channel. In this case two separate carrier frequencies are needed, one for the called and the other for the calling subscriber to prevent interference. The calling subscriber dials the desired number and then hangs up. The bells of both subscribers ring just as in the case of a revertive ringing arrangement in an automatic exchange. When the called party answers, the crystal switching relay in his terminal changes to the other carrier frequency different from that of the calling subscriber's carrier frequency and both can now proceed with conversation.

Use of Radio to Link Rural Subscribers

THE BELL SYSTEM has been conducting experiments with the use of radio links to connect rural subscribers located too far apart to be economically served by wire lines, particularly in the location of rough and difficult terrain. In such localities, power lines are rarely available on which a telephone carrier may be superimposed.

At one locality, Cheyenne Wells, Colorado, a number of ranches located at distances ranging from 11 to 20 miles apart are linked by radio to the central office. Each of the ranches has crystal-controlled receiver and transmitting equipment with control apparatus between the radio equipment and the subscriber's telephone.

Each station is arranged to transmit one of two carrier frequencies differing one from the other by only a few hundred kilocycles. Provided that no other subscriber is transmitting, the lower frequency carrier is radiated when one subscriber is using the equipment.

Radiation from a subscriber's antenna causes the transmitter at the central office to be energized. The carrier from the central office, in turn, causes a crystal switching relay in each of the subscriber's sets to change to a different operating carrier frequency. This is done to prevent a second subscriber from interfering with the transmission of the first subscriber in case the former also wants a connection with a central office at the same time. The second subscriber can, of course, reach the operator by means of the second carrier frequency, since the office has another receiver on which to pick up this carrier.

The central office transmitter oper-

ates on a frequency different from those by the subscriber stations. All three frequencies are in the 44 to 50 megacycle band. The central office transmitter and the subscribers' transmitters produce frequency modulated carriers for speech transmission and amplitude-modulated carriers for signalling central office or ringing the subscribers' bells.

Two receivers are employed at the central office to pick up the carriers from the subscribers' transmitters. One receiver is tuned to the frequency of the carrier used by the first subscriber calling in and the other receiver is tuned to the frequency of the switched carrier of a second subscriber attempting to contact central office while the first subscriber has the connection.

When a subscriber wishes to make a call, he lifts the handpiece of his handset telephone and listens in the receiver. If he hears no conversation, he knows he can proceed to call central. He then pulls up one of the plungers in the cradle switch to turn on his transmitter.

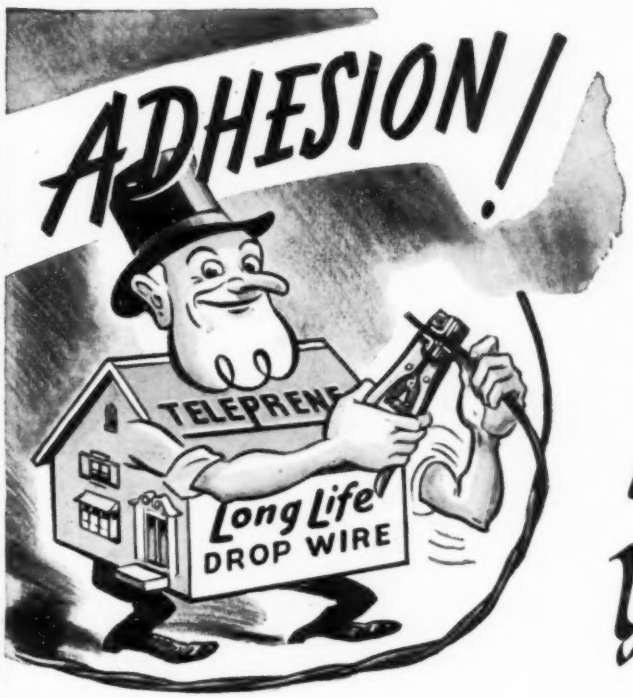
The central office receiver picks up the radiated carrier and a signal lights at the switchboard. The operator plugs in to answer the signal and the subscriber gives his number. When he is through with his call, he replaces his handpiece, taking the transmitter off the air and operating the disconnect signal at central. The operator then takes down the connection.

If it happens that the party the calling subscriber wishes to contact is on the same radio link, the operator asks the subscriber to hang up while his party is being rung. He replaces his handpiece on the cradle momentarily and then takes it up again to listen in the receiver. This action cuts off the transmitter during the time the operator is ringing the desired party. As soon as this party answers, the subscriber pulls up the plunger in the cradle to turn the transmitter on again and proceeds with the conversation.

In this case, because the calling subscriber's carrier came into the office first, the called subscriber's original frequency was switched to the second carrier frequency and the called subscriber now uses that frequency. This results in all three transmitters operating on different frequencies without interference to either subscriber. This situation is illustrated in *Figure* 8.

The antenna equipment is mounted on a telephone pole of the proper

(*Please turn to page* 105)



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N STROWGER TELECOMMUNICATIONS

Photo : Final Selector Rack, Lisbon Exchange

The placing into service of the Norte Automatic Telephone Exchange in 1934 marked the completion of an advanced stage in the conversion to full automatic working of Lisbon's extensive Telephone network. Norte had an initial capacity of 8,800 lines and served the mainly residential area of the network owned and operated by the Anglo Portuguese Telephone Company; it has since been extended and 13,200 lines are now either in service or in process of installation, both subscriber and coin-box lines being provided.

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height to insure line of sight operation for the carrier frequency utilized (in the 44-50 mc band). Two vertical whip type antennas are utilized, one for receiving and the other for transmitting. They are mounted at opposite ends of two parallel telephone crossarms at the pole, as indicated in *Figure* 8. A coaxial cable leads from each antenna to the radio equipment.

Due to the fact that no power lines extend to the ranches, it is necessary to use an auxiliary source of power for the radio installations on the subscriber's premises. The ranches have 32-volt d-c light plants. These are utilized for the power source by interposing vibrator type equipment between the d-c supply and the radio equipment. The receiving equipment operates continuously, but the transmitter goes on only when the subscriber desires to call out.

Conclusion

WE HAVE discussed the salient points of recent developments in methods of furnishing telephone service to rural subscribers. These methods have proved feasible from a technological viewpoint. With the exception of long span construction and possibly rural line joint-use arrangement, there remains the question of the high cost of the initial investment in equipment to furnish telephone service via power wires or radio link. Only actual experience over a long period of time will show whether such investment is justified. —THE END.

◆

Captain David R. Hull Joins International T.&T.

Captain David R. Hull, U.S. Navy (Retired), who has been closely identified with electronic research and radar development for the Navy during the past 23 years, the last two years as assistant chief of the Bureau of Ships for Electronics, has been appointed assistant technical director of the International Corporation.

Captain Hull, who has been awarded the Legion of Merit and other military honors for his services during the war, has been engaged in radio and electronic research work since his graduation from the U.S. Naval Academy.

Following his graduation from Annapolis, Captain Hull was engaged in a variety of assignments in the radio field, taking time out in 1933 to receive his M. S. degree from Harvard University. After three years in technical sonar development work with the

(*Please turn to page* 108)

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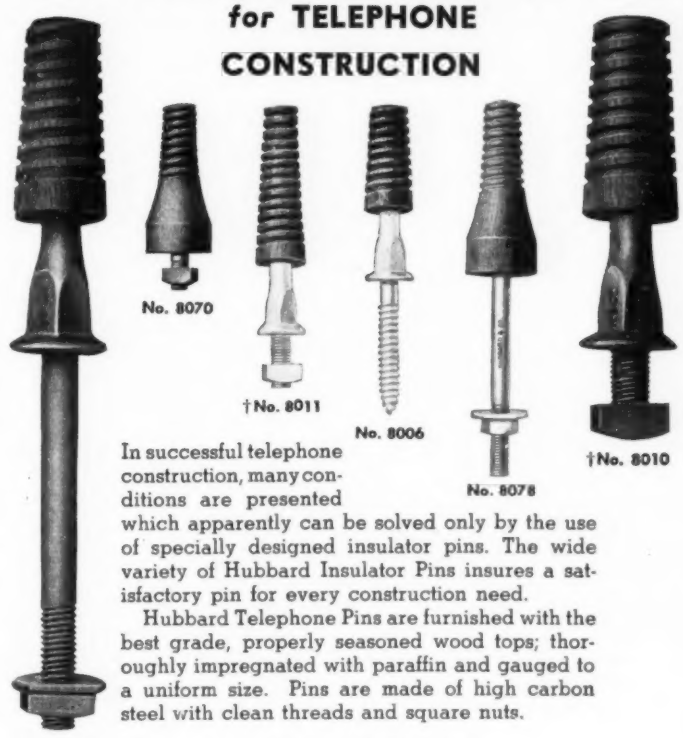

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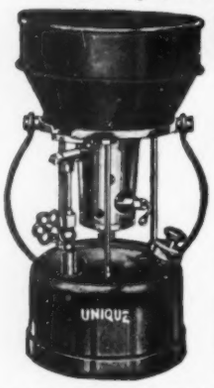

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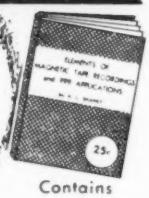

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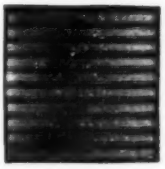

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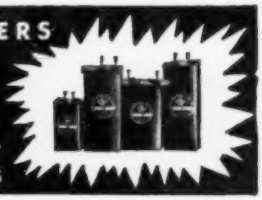

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Pacific Fleet, he was appointed head of the Underwater Sound Section, Bureau of Engineering. He served in this capacity until 1939 when he was transferred to duty as Commanding Officer of the USS SEMMES, the Navy's electronics experimental ship. It was his work as Assistant Director of the Naval Research Laboratory and head of the Design Branch, Electronics Division, Bureau of Ships, during the period from 1940 to 1945 that resulted in his commendation by high navy officials.

◆

Sales Force Expands at Federal Tel. & Radio Corp.

Bamford E. Rogers has joined Federal Telephone & Radio Corporation, Clifton, New Jersey, American affiliate of International Telephone & Telegraph Corporation, as sales engineer of wire transmission equipment for Independent telephone companies and

BAMFORD E. ROGERS

he will concentrate chiefly on FTR's 9-H-1 short-haul carrier system—one of Federal's latest carrier developments.

Until October 15 of last year, Mr. Rogers was staff engineer with Kenneth A. McIntyre Associates of New York City. Prior to that he was associated with the Western Union Telegraph Company and B. F. Goodrich Company. Mr. Rogers is a graduate of Harvard College and received his M.B.A. degree from the Harvard Graduate School of Business Administration.

During the war he served as a Lieut. Commander with the U. S. Navy, serving 19 months in the Aleutians and also as Communications Officer with the Chief of Naval Operations, Washington, D. C.

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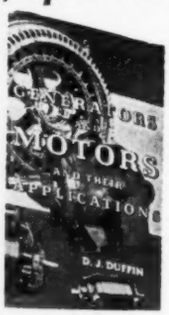
LEXINGTON, KENTUCKY

How to select, operate and repair electric generators and motors



Here is a practical manual written to give on the job help to motor repairmen, armature winders, and others who work with electric motors and generators. It describes and illustrates an exceptionally wide variety of types, makes, sizes and designs of alternating-current and direct-current equipment in commercial use today. It details all the important working data you need in order to select, operate, repair and maintain the electrical equipment in your shop or factory more efficiently and economically.

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This book explains operating characteristics of various types of motors and generators; shows how to avoid damage in operation, how to regulate, how to insulate, how to cool, how to test for performance efficiency, etc. It covers everything from preventive-maintenance inspection tables, to the latest special protective design features of today's commercial machinery. Particularly valuable are the step-by-step plans that show you what factors to consider in selecting motors and generators, and show you how to choose the right equipment for each specific job.

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Chicago 26, Ill.

THE BACK OF THE BOOK

By JOHN G. REYNOLDS
Managing Editor

Mistakes . . . Straight from THE NEWS, published by the Southwestern States Telephone Company, comes this reminder on the subject of mistakes. "When a business man makes a mistake he pays for it out of the business. When a plumber makes a mistake the customer both suffers and pays. When the doctor makes a mistake the undertaker and preacher bury it. When the bureaucrat or the army roadbuilder makes a mistake the taxpayers foot the bill, the bureau and the army ask for large appropriations and congress investigates." . . . We might add—"When a telephone company makes a mistake" —well you finish it . . . .

• • •

Two Different Names . . . For many years almost every stump speaker and every orator has talked about the division between capital and labor. It is always labor vs. capital, or capital vs. labor. We have come to the point where most of us believe that labor is one thing and capital is another.

We had better get wise to a fact that's as old as the hills. Capital and labor are two different names for two different aspects of precisely the same thing. Labor is capital in prospect and capital is the profit on labor expended in production.

Every dollar you save out of your income is capital—a profit on your own labor. Every individual who has a dollar or more in a savings bank, in life insurance, or in any other form of security, is a capitalist. That money is at work helping to provide facilities for labor to make more money.

Capital is the surplus that is left after labor is paid for. Labor is the power to produce. Unless capital and labor march hand in hand production lags, money becomes scarce, and capital evaporates.

• • •

National Problems . . . Telephone industry is not alone in problem of attempting to stretch inadequate profits to meet the requirements of current business expansion.

An analysis based on Department of Commerce figures shows that of the $28 billion of corporate profits, Federal and state corporate income taxes take $11.2 billion. About $6.2 billion are paid out in dividends, leaving $10.6 billion of retained earnings.

The $10.6 billion of retained earnings seem very large until it it discovered that this amount is utterly inadequate to finance the current expansion. Department of Commerce data indicate that business expenditures for producers' equipment have been running at an annual rate of between $20 and $25 billion.

Including funds from current depreciation charges, only about two-thirds of these gigantic outlays can be met out of reinvested earnings. Despite the sharp increases in profits over pre-war figures, corporate business has had to go out and borrow money and sell new capital issues amounting to billions of dollars. Even in the face of all such resources, corporate cash on hand has been falling at the rate of approximately $5 billion a year.

As to what industry is doing with the "inflated profits it is now taking from the inflation spiral," the first thing the stockholders do with their $6.2 billion of dividends is to pay income taxes of about $2 billion on the dividends!

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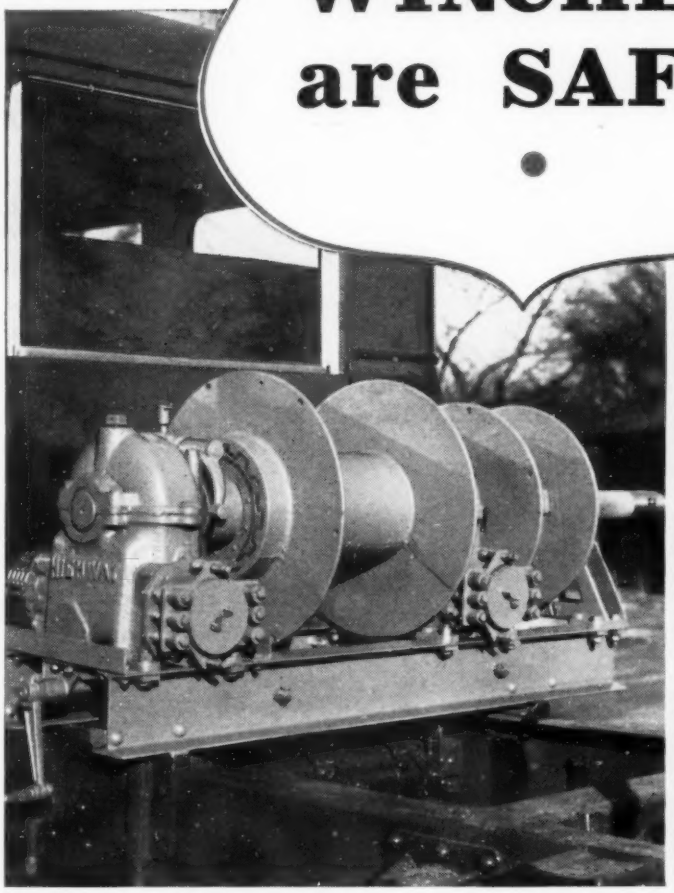
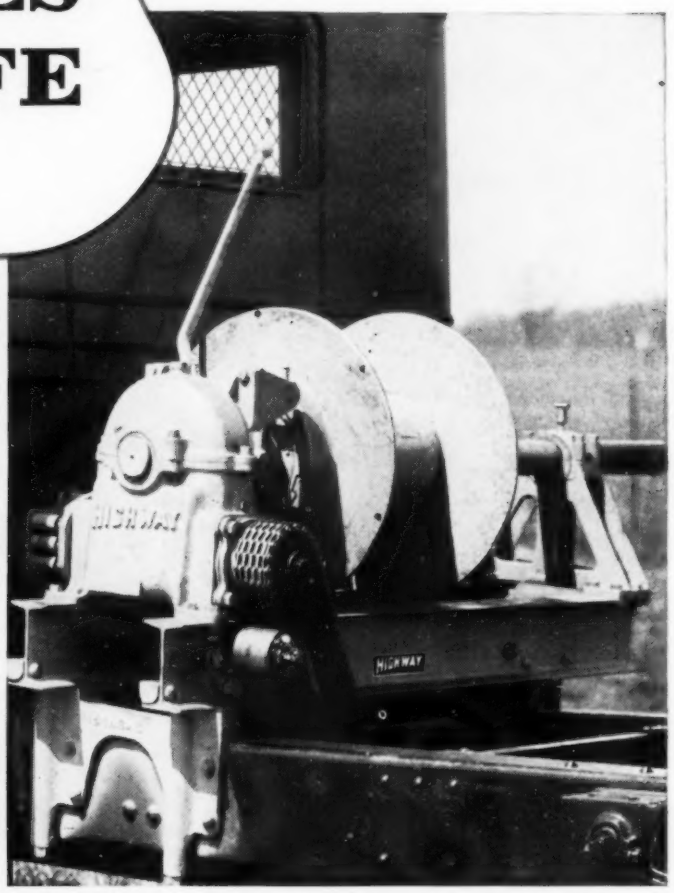


HIGHWAY MODEL L-16C-6 Double Drum Winch is a dual-purpose unit. 16" drum has spline type clutch. 6" drum is fixed type.



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